US007715783B2

(12) **United States Patent**
Girard et al.

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(45) **Date of Patent: May 11, 2010**

(54) **SYSTEM AND METHOD FOR RECEIVING BROADCAST CONTENT ON A MOBILE PLATFORM DURING INTERNATIONAL TRAVEL**

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(73) Assignee: **Panasonic Avionics Corporation**, Bothell, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 700 days.

(21) Appl. No.: **11/269,378**

(22) Filed: **Nov. 7, 2005**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
H04H 20/74 (2008.01)

(52) **U.S. Cl.** **455/3.02**; 725/73; 725/76

(58) **Field of Classification Search** 455/3.02; 725/73, 76

See application file for complete search history.

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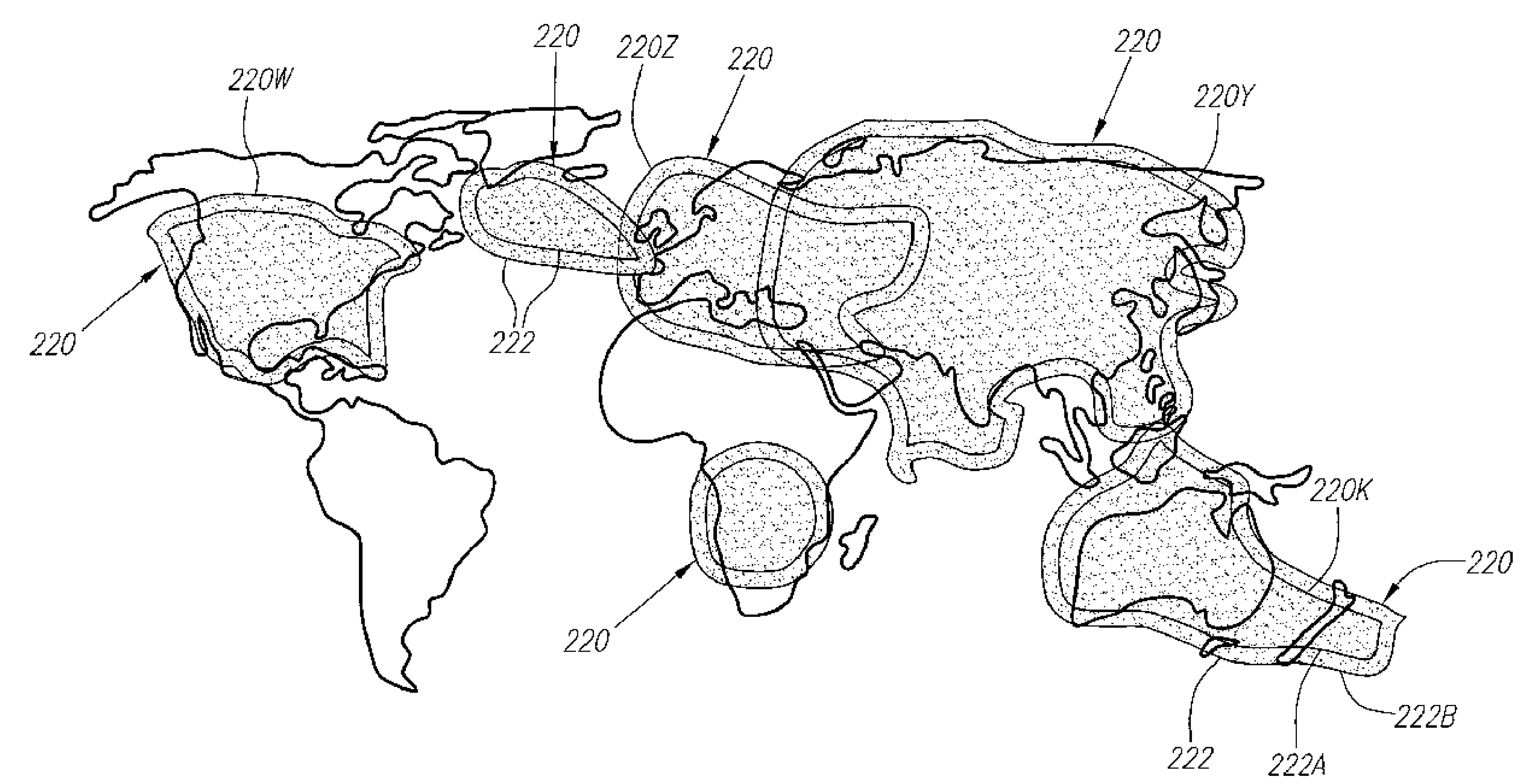
Primary Examiner—Nay A Maung
Assistant Examiner—Angelica M Perez
(74) *Attorney, Agent, or Firm*—Orrick, Herrington & Sutcliffe

(57) **ABSTRACT**

A vehicle information system for passenger vehicles, such as automobiles and aircraft, and methods for manufacturing and using same. The vehicle information system includes a universal antenna system and a universal receiver system for receiving viewing content provided by diverse content sources during travel, including international travel. The universal antenna and receiver system provide selected viewing content for distribution throughout the vehicle information system and presentation via one or more passenger interfaces. As the vehicle approaches the coverage region of a selected content source, the vehicle information system automatically reconfigures the universal antenna and receiver system to receive viewing content from the content source without requiring manual adjustment to, or replacement of, the universal antenna system and/or the universal receiver system. Passengers traveling aboard the vehicle thereby can continuously enjoy the viewing content during travel with limited interruption in service and without unwanted travel delays.

48 Claims, 23 Drawing Sheets



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2006/0270373	A1	11/2006	So	
2007/0044126	A1	2/2007	Mitchell	

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WO	WO 2006/062641	A2	6/2006
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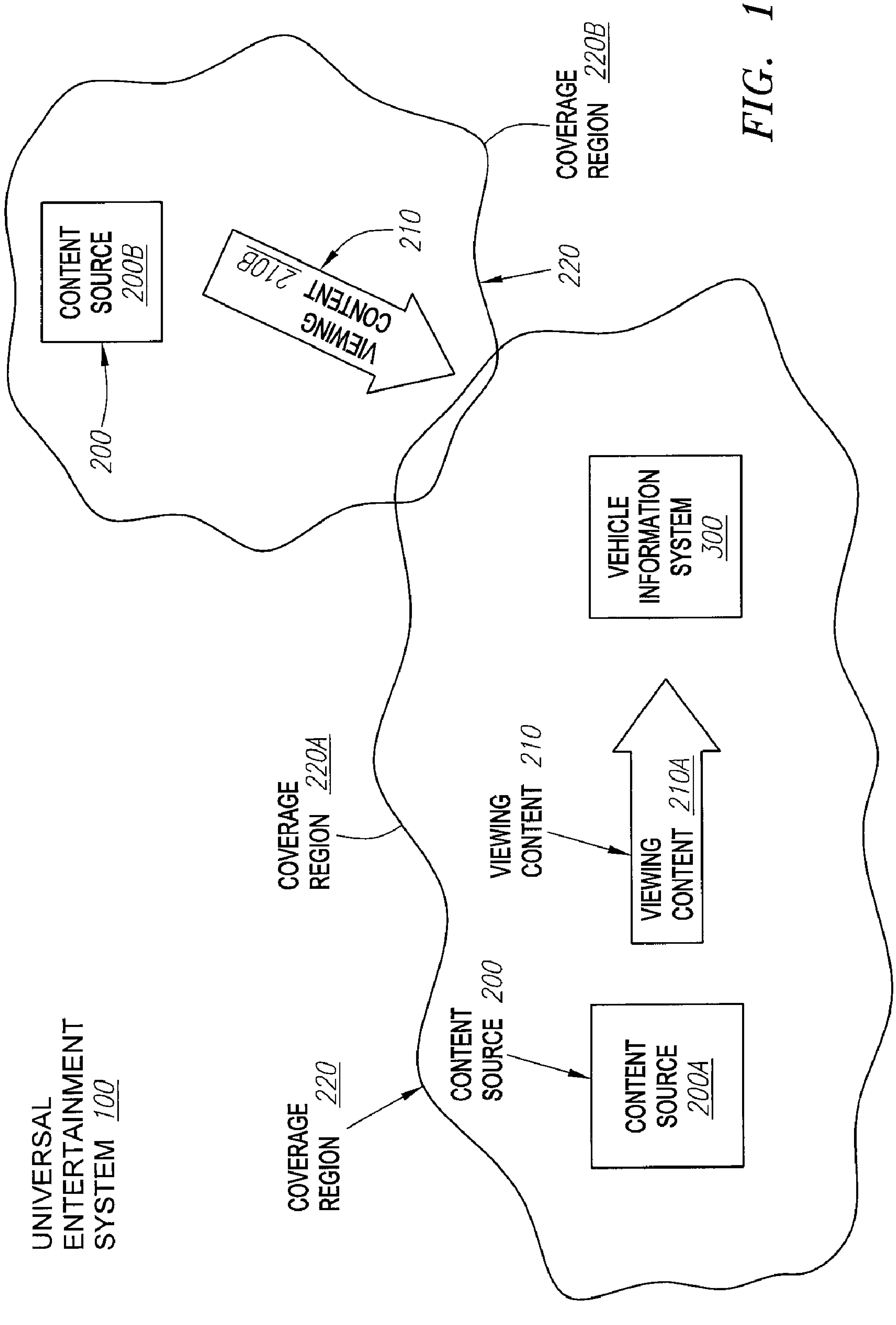
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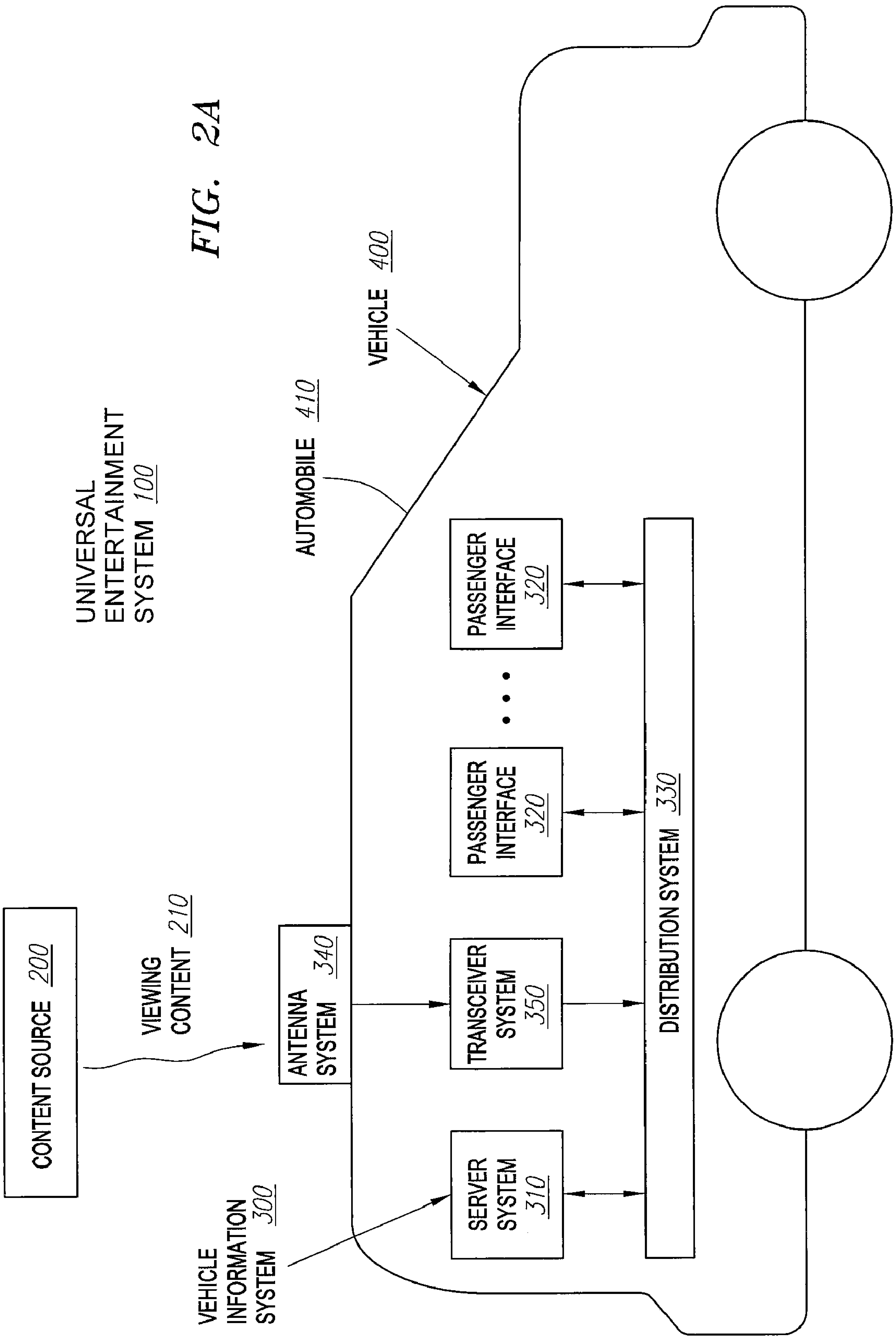
CONTENT SOURCE 200
CONTENT SOURCE 200A
COVERAGE REGION 220A
VIEWING CONTENT 210
VIEWING CONTENT 210A
VEHICLE INFORMATION SYSTEM 300
200
CONTENT SOURCE 200B
VIEWING CONTENT 210B
210
220
COVERAGE REGION 220B

FIG. 1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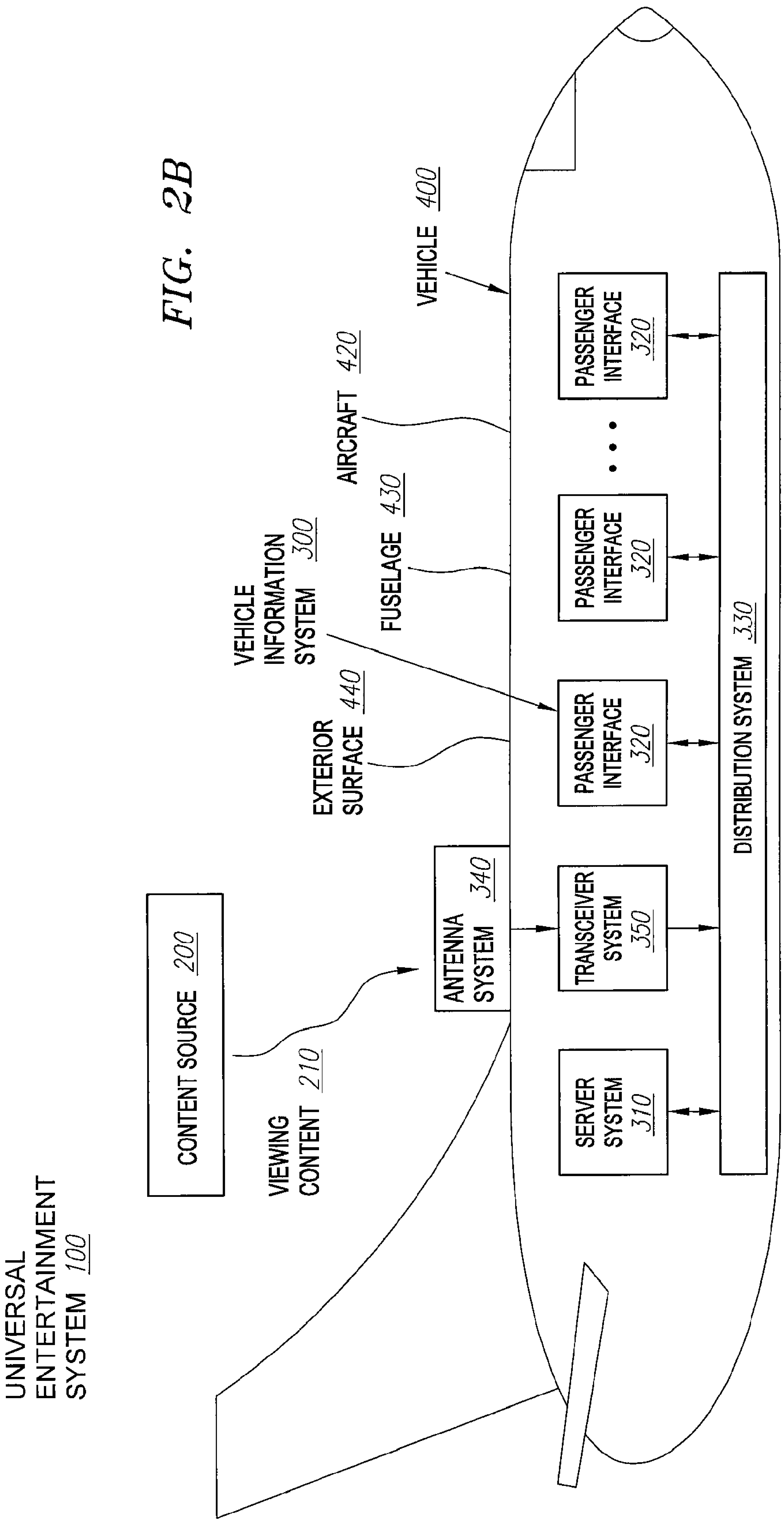
VIEWING CONTENT 210
VEHICLE INFORMATION SYSTEM 300
SERVER SYSTEM 310
PASSENGER INTERFACE 320
PASSENGER INTERFACE 320
DISTRIBUTION SYSTEM 330
ANTENNA SYSTEM 340
TRANSCEIVER SYSTEM 350
VEHICLE 400
AUTOMOBILE 410

FIG. 2A

FIG. 2B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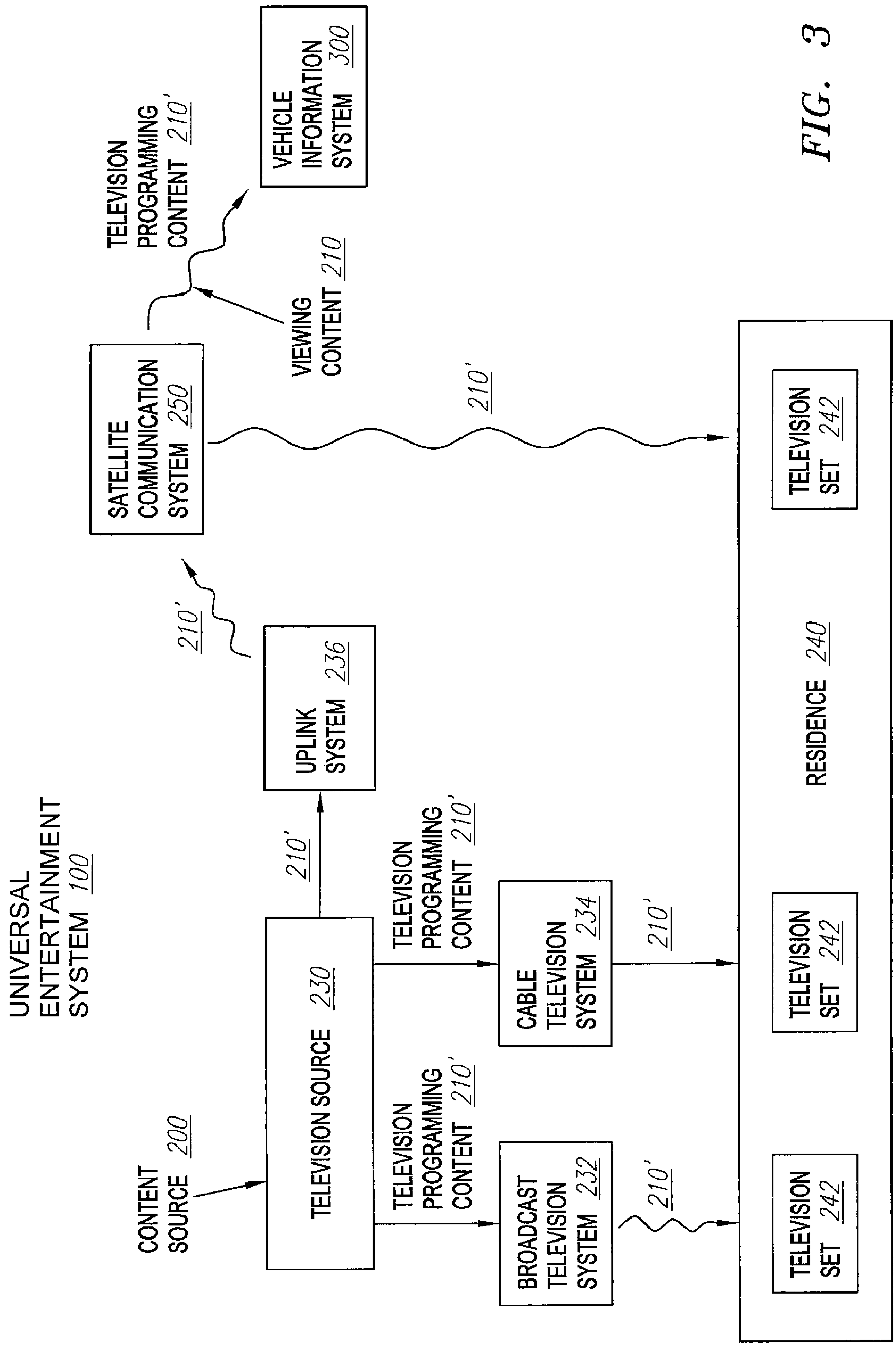
CONTENT SOURCE 200
VIEWING CONTENT 210
ANTENNA SYSTEM 340
EXTERIOR SURFACE 440
VEHICLE INFORMATION SYSTEM 300
FUSELAGE 430
AIRCRAFT 420
VEHICLE 400
SERVER SYSTEM 310
TRANSCEIVER SYSTEM 350
PASSENGER INTERFACE 320
PASSENGER INTERFACE 320
PASSENGER INTERFACE 320
DISTRIBUTION SYSTEM 330



UNIVERSAL ENTERTAINMENT SYSTEM 100
CONTENT SOURCE 200
TELEVISION SOURCE 230
TELEVISION PROGRAMMING CONTENT 210'
TELEVISION PROGRAMMING CONTENT 210'
BROADCAST TELEVISION SYSTEM 232
CABLE TELEVISION SYSTEM 234
210'
210'
210'
UPLINK SYSTEM 236
210'
SATELLITE COMMUNICATION SYSTEM 250
210'
VIEWING CONTENT 210
TELEVISION PROGRAMMING CONTENT 210'
VEHICLE INFORMATION SYSTEM 300
RESIDENCE 240
TELEVISION SET 242
TELEVISION SET 242
TELEVISION SET 242

FIG. 3

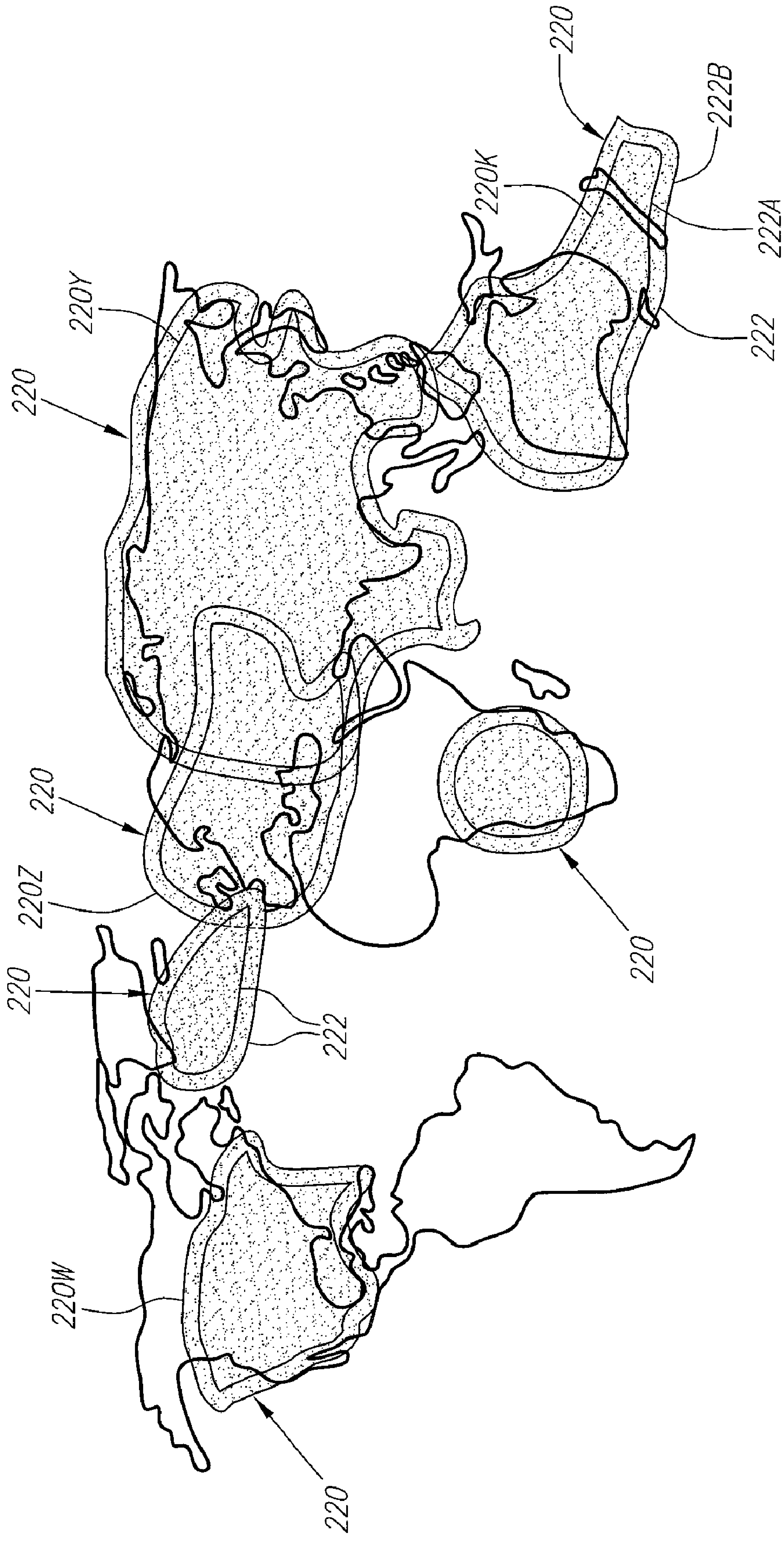
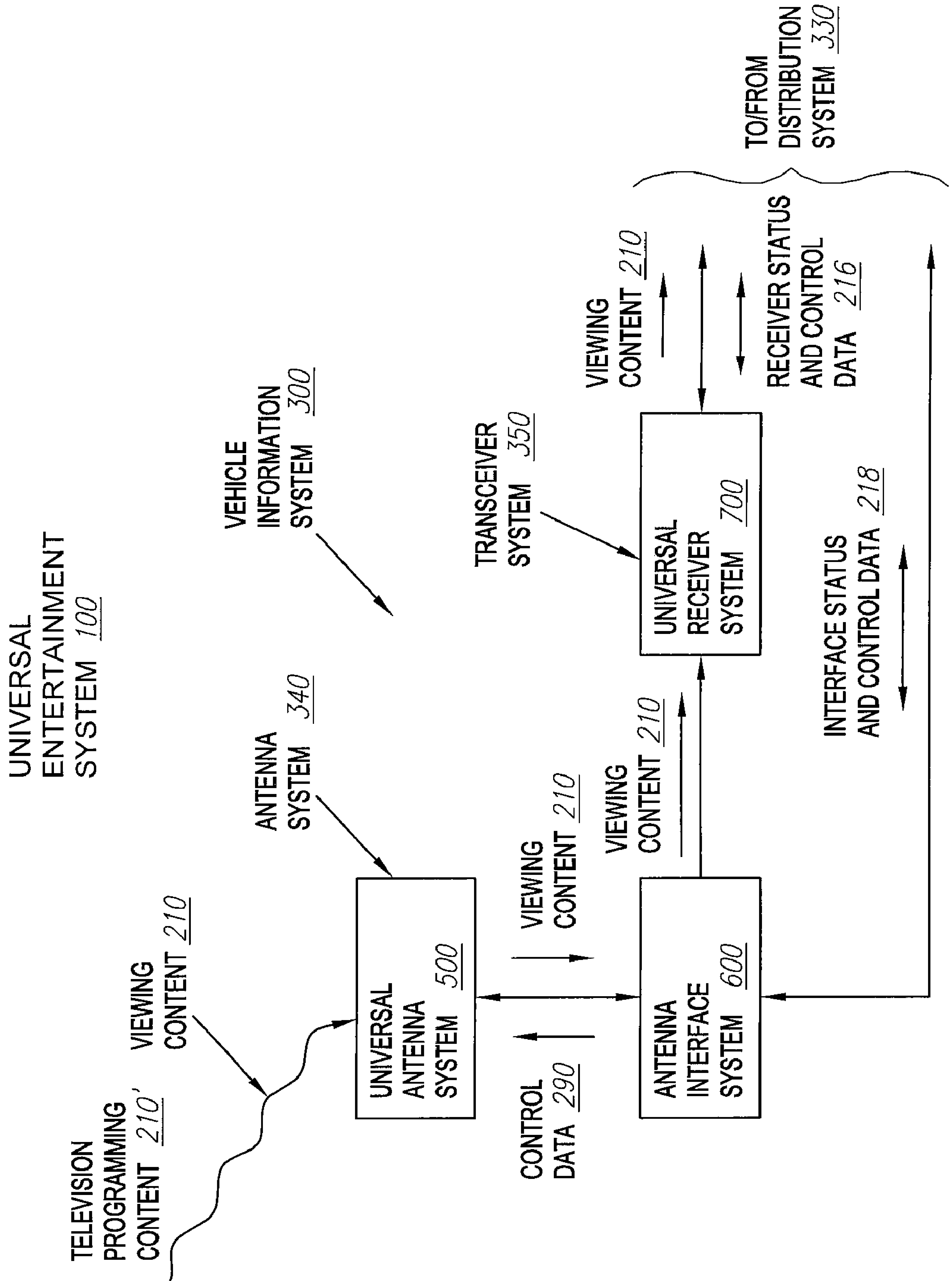


FIG. 4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VEHICLE INFORMATION SYSTEM 300
SATELLITE COMMUNICATION SYSTEM 250
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
ANTENNA SYSTEM 340
UNIVERSAL ANTENNA SYSTEM 500
VIEWING CONTENT 210
CONTROL DATA 290
ANTENNA INTERFACE SYSTEM 600
VIEWING CONTENT 210
TRANSCEIVER SYSTEM 350
UNIVERSAL RECEIVER SYSTEM 700
VIEWING CONTENT 210
RECEIVER STATUS AND CONTROL DATA 216
INTERFACE STATUS AND CONTROL DATA 218
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 5

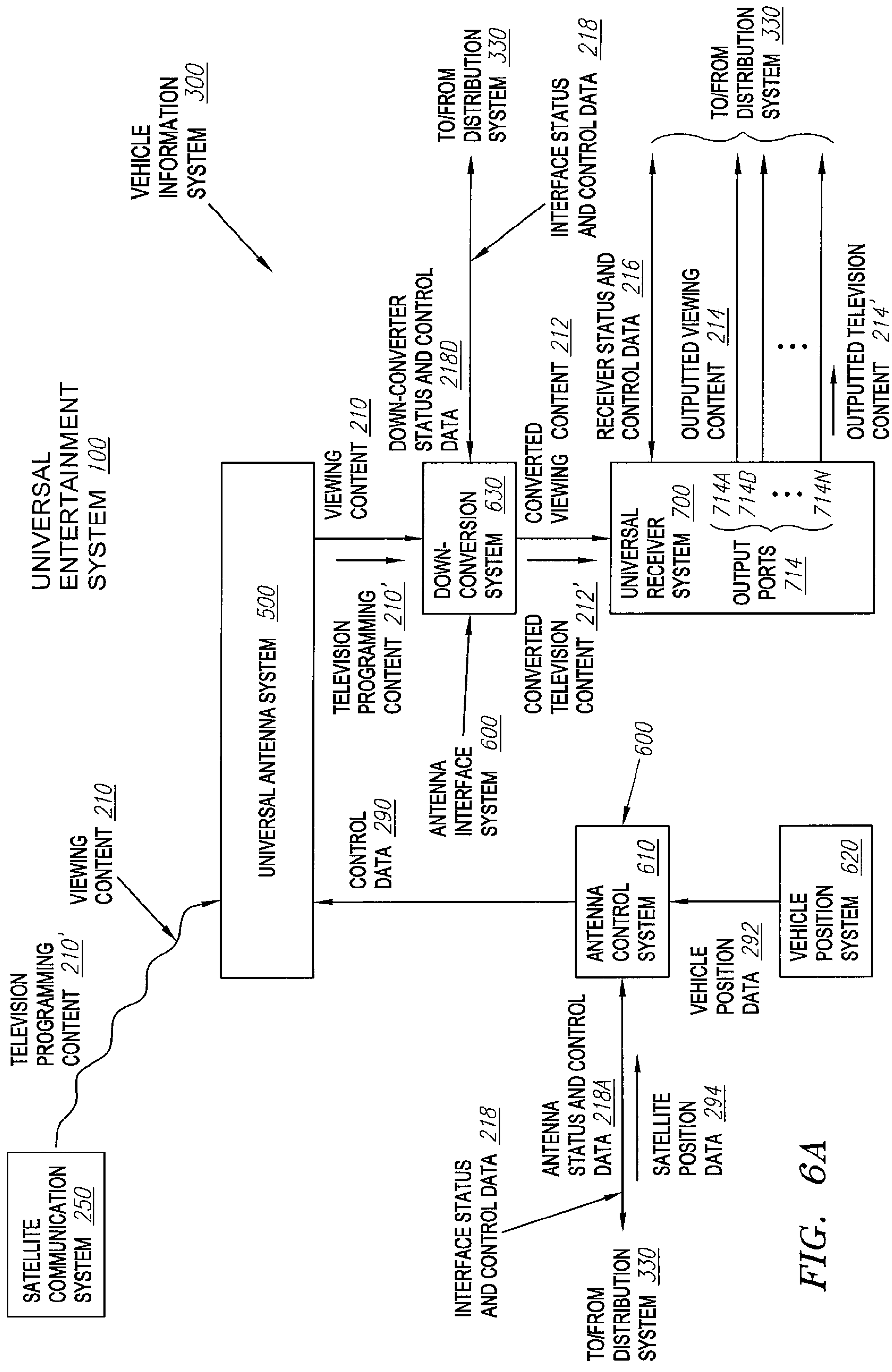
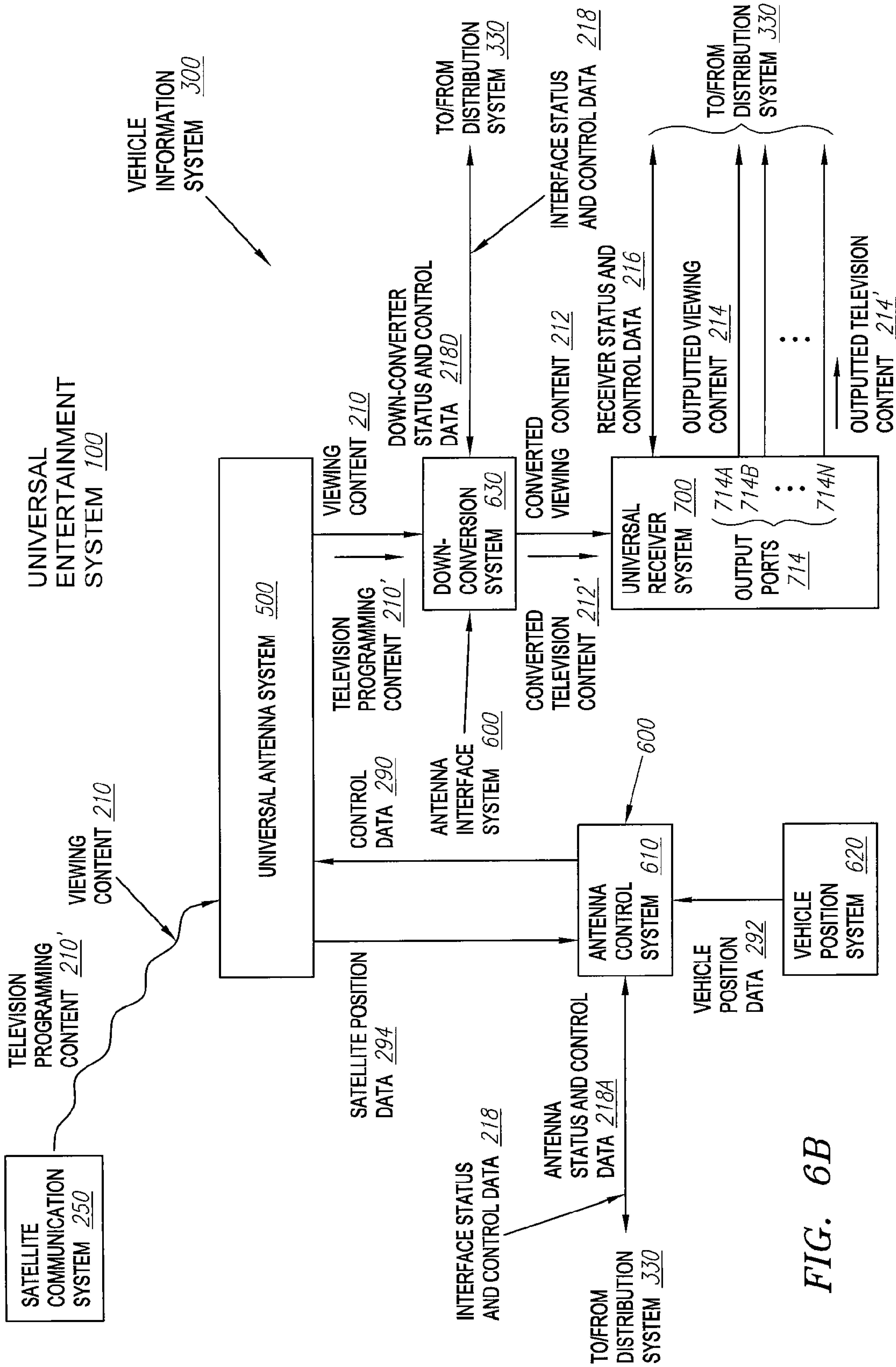

UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
SATELLITE COMMUNICATION SYSTEM 250
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
UNIVERSAL ANTENNA SYSTEM 500
VIEWING CONTENT 210
TELEVISION PROGRAMMING CONTENT 210'
CONTROL DATA 290
ANTENNA INTERFACE SYSTEM 600
600
DOWN-CONVERSION SYSTEM 630
DOWN-CONVERTER STATUS AND CONTROL DATA 218D
TO/FROM DISTRIBUTION SYSTEM 330
INTERFACE STATUS AND CONTROL DATA 218
CONVERTED VIEWING CONTENT 212
CONVERTED TELEVISION CONTENT 212'
UNIVERSAL RECEIVER SYSTEM 700
OUTPUT PORTS 714
714A
714B
714N
RECEIVER STATUS AND CONTROL DATA 216
OUTPUTTED VIEWING CONTENT 214
OUTPUTTED TELEVISION CONTENT 214'
TO/FROM DISTRIBUTION SYSTEM 330
ANTENNA CONTROL SYSTEM 610
VEHICLE POSITION DATA 292
VEHICLE POSITION SYSTEM 620
ANTENNA STATUS AND CONTROL DATA 218A
SATELLITE POSITION DATA 294
INTERFACE STATUS AND CONTROL DATA 218
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 6A



UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
SATELLITE COMMUNICATION SYSTEM 250
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
UNIVERSAL ANTENNA SYSTEM 500
VIEWING CONTENT 210
TELEVISION PROGRAMMING CONTENT 210'
CONTROL DATA 290
SATELLITE POSITION DATA 294
ANTENNA INTERFACE SYSTEM 600
600
ANTENNA CONTROL SYSTEM 610
VEHICLE POSITION DATA 292
VEHICLE POSITION SYSTEM 620
INTERFACE STATUS AND CONTROL DATA 218
ANTENNA STATUS AND CONTROL DATA 218A
TO/FROM DISTRIBUTION SYSTEM 330
DOWN-CONVERSION SYSTEM 630
DOWN-CONVERTER STATUS AND CONTROL DATA 218D
TO/FROM DISTRIBUTION SYSTEM 330
INTERFACE STATUS AND CONTROL DATA 218
CONVERTED VIEWING CONTENT 212
CONVERTED TELEVISION CONTENT 212'
UNIVERSAL RECEIVER SYSTEM 700
OUTPUT PORTS 714
714A
714B
714N
RECEIVER STATUS AND CONTROL DATA 216
OUTPUTTED VIEWING CONTENT 214
OUTPUTTED TELEVISION CONTENT 214'
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 6B

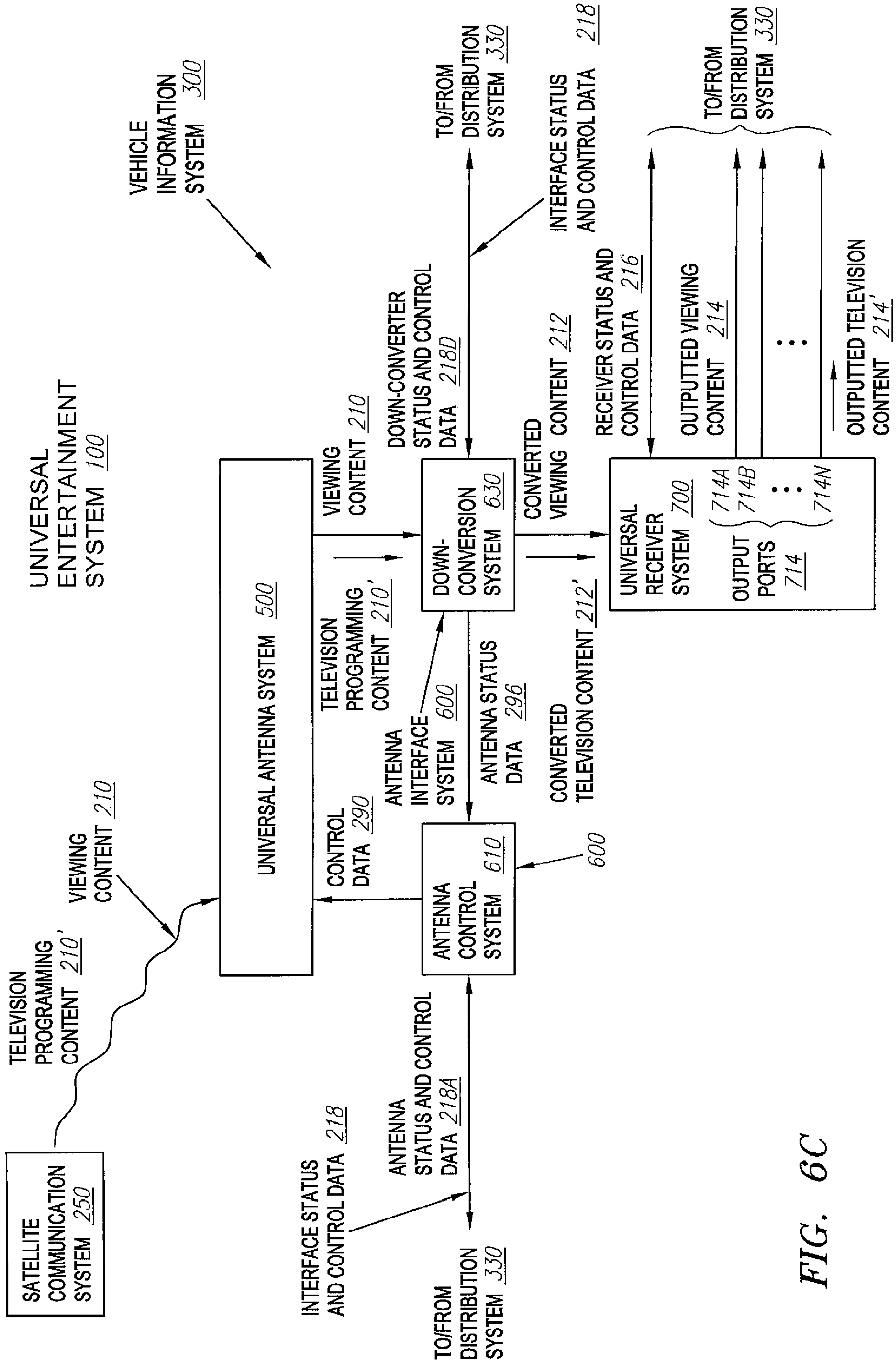

UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
SATELLITE COMMUNICATION SYSTEM 250
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
UNIVERSAL ANTENNA SYSTEM 500
CONTROL DATA 290
ANTENNA CONTROL SYSTEM 610
600
ANTENNA INTERFACE SYSTEM 600
VIEWING CONTENT 210
TELEVISION PROGRAMMING CONTENT 210'
DOWN-CONVERSION SYSTEM 630
ANTENNA STATUS DATA 296
DOWN-CONVERTER STATUS AND CONTROL DATA 218D
TO/FROM DISTRIBUTION SYSTEM 330
INTERFACE STATUS AND CONTROL DATA 218
CONVERTED VIEWING CONTENT 212
CONVERTED TELEVISION CONTENT 212'
UNIVERSAL RECEIVER SYSTEM 700
OUTPUT PORTS 714
714A
714B
714N
RECEIVER STATUS AND CONTROL DATA 216
OUTPUTTED VIEWING CONTENT 214
OUTPUTTED TELEVISION CONTENT 214'
TO/FROM DISTRIBUTION SYSTEM 330
ANTENNA STATUS AND CONTROL DATA 218A
INTERFACE STATUS AND CONTROL DATA 218
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 6C

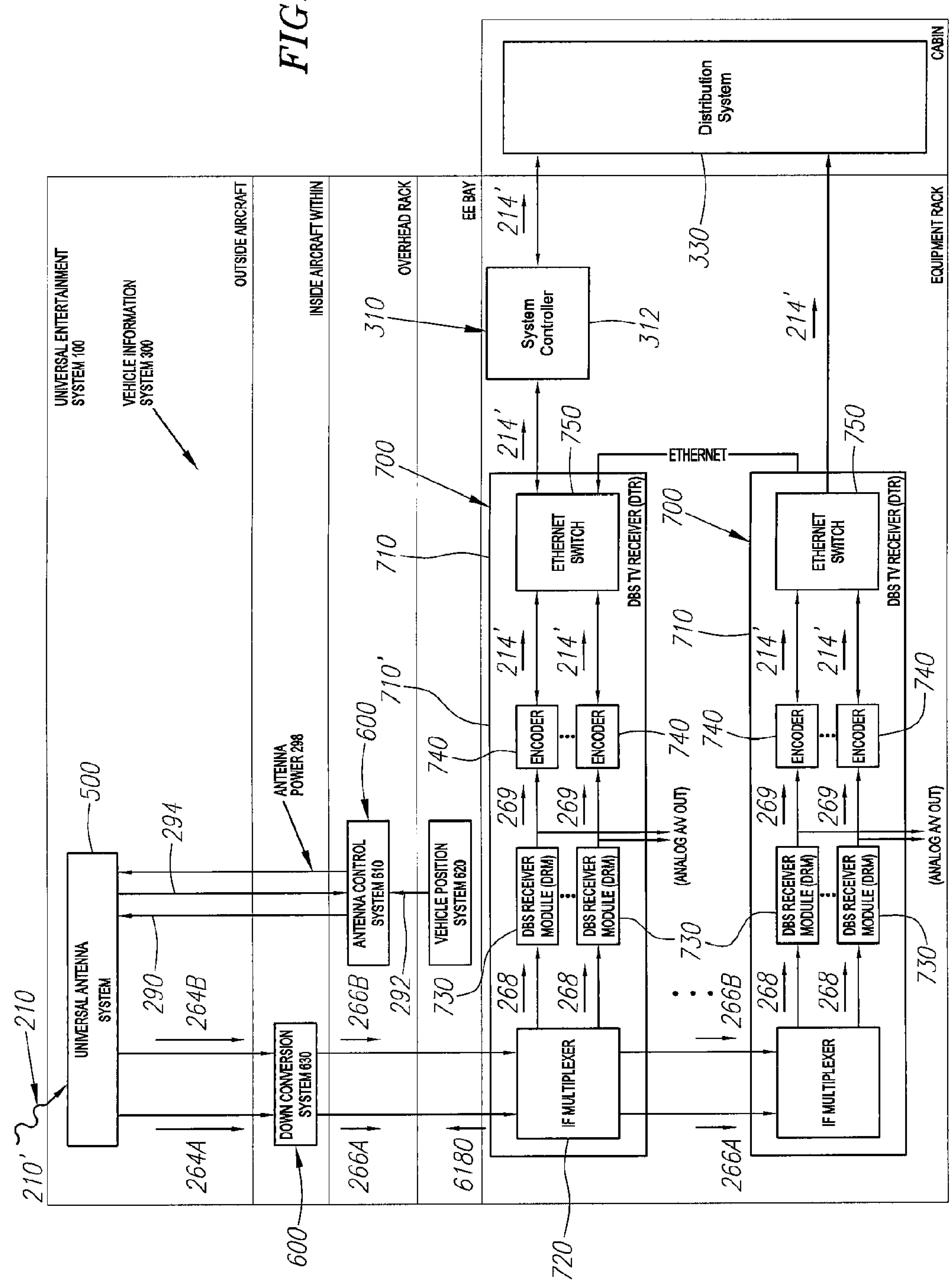

UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
OUTSIDE AIRCRAFT
INSIDE AIRCRAFT WITHIN
OVERHEAD RACK
EE BAY
EQUIPMENT RACK
CABIN
UNIVERSAL ANTENNA SYSTEM
ANTENNA POWER 298
DOWN CONVERSION SYSTEM 630
ANTENNA CONTROL SYSTEM 610
VEHICLE POSITION SYSTEM 620
IF MULTIPLEXER
DBS RECEIVER MODULE (DRM)
ENCODER
ETHERNET SWITCH
DBS TV RECEIVER (DTR)
(ANALOG A/V OUT)
ETHERNET
System Controller
Distribution System
210
210'
500
290
294
292
264A
264B
266A
266B
268
269
600
6180
700
710
710'
720
730
740
750
214'
310
312
330

FIG. 7

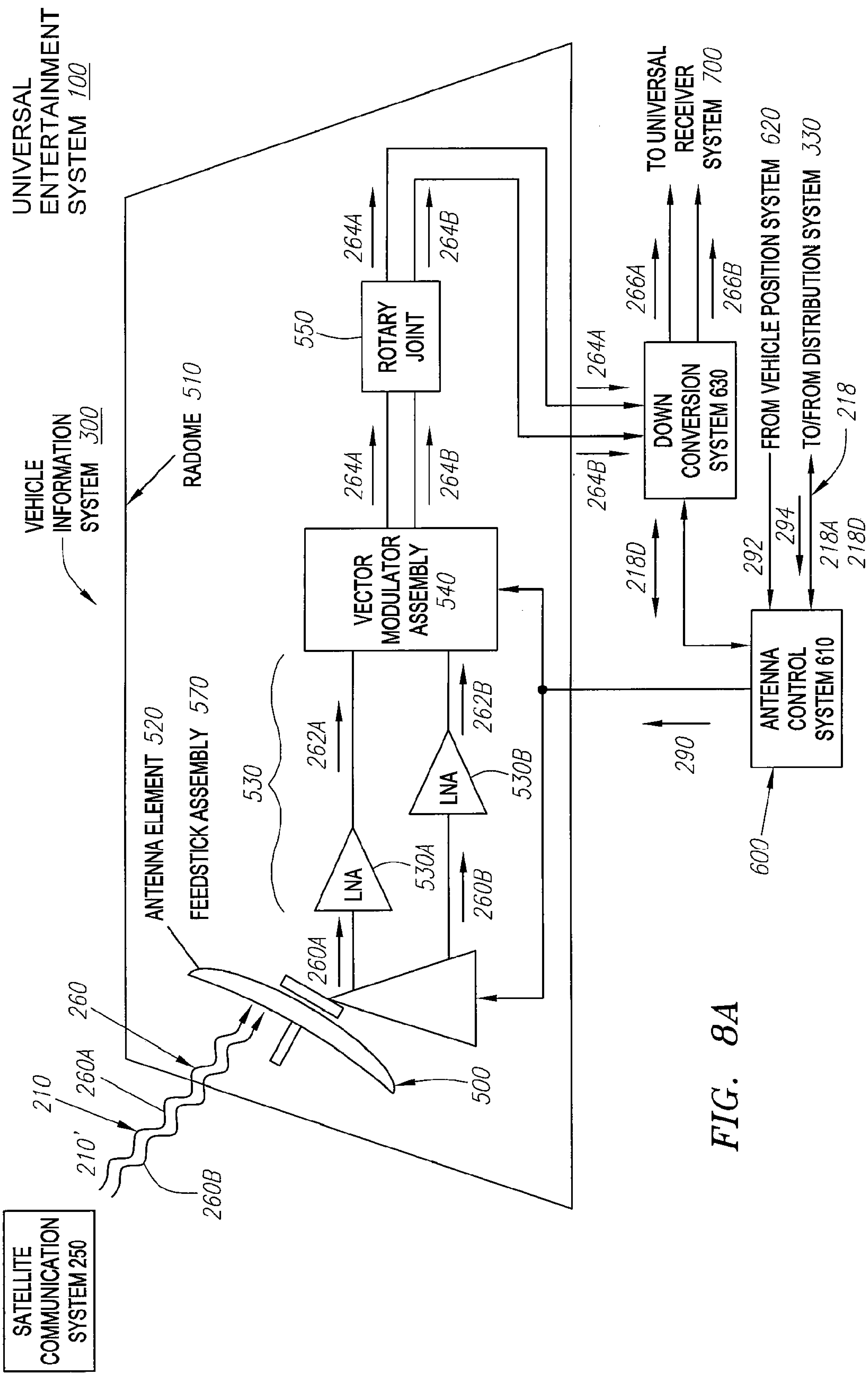

UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
RADOME 510
TO UNIVERSAL RECEIVER SYSTEM 700
FROM VEHICLE POSITION SYSTEM 620
TO/FROM DISTRIBUTION SYSTEM 330
264A
264B
266A
266B
550
ROTARY JOINT
DOWN CONVERSION SYSTEM 630
218
VECTOR MODULATOR ASSEMBLY 540
218D
292
294
218A
218D
ANTENNA ELEMENT 520
FEEDSTICK ASSEMBLY 570
530
262A
262B
LNA
530A
530B
290
ANTENNA CONTROL SYSTEM 610
600
260A
260B
260
210
210'
500
SATELLITE COMMUNICATION SYSTEM 250

FIG. 8A

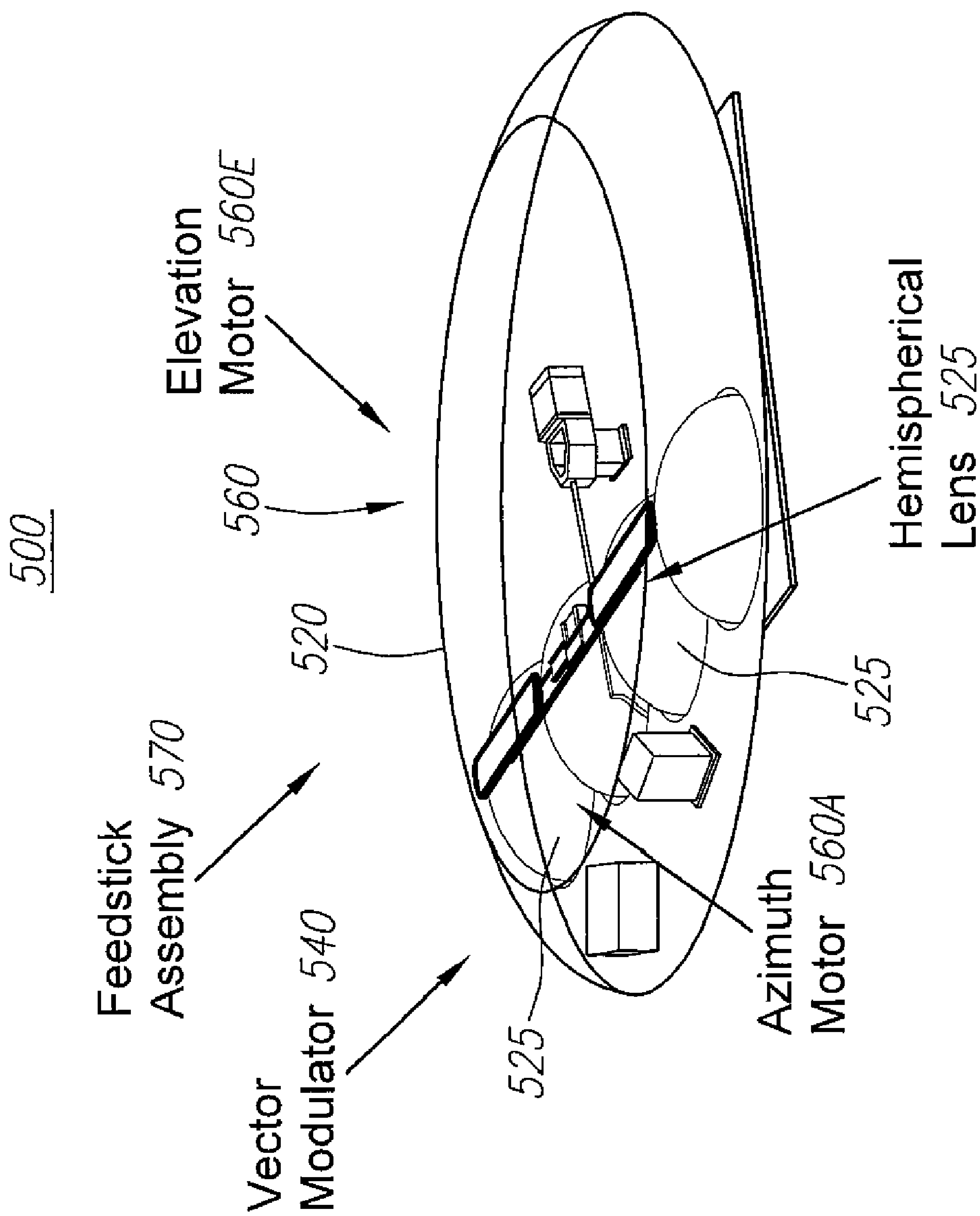

500
Elevation Motor 560E
560
520
Feedstick Assembly 570
Vector Modulator 540
525
Azimuth Motor 560A
525
Hemispherical Lens 525

FIG. 8B

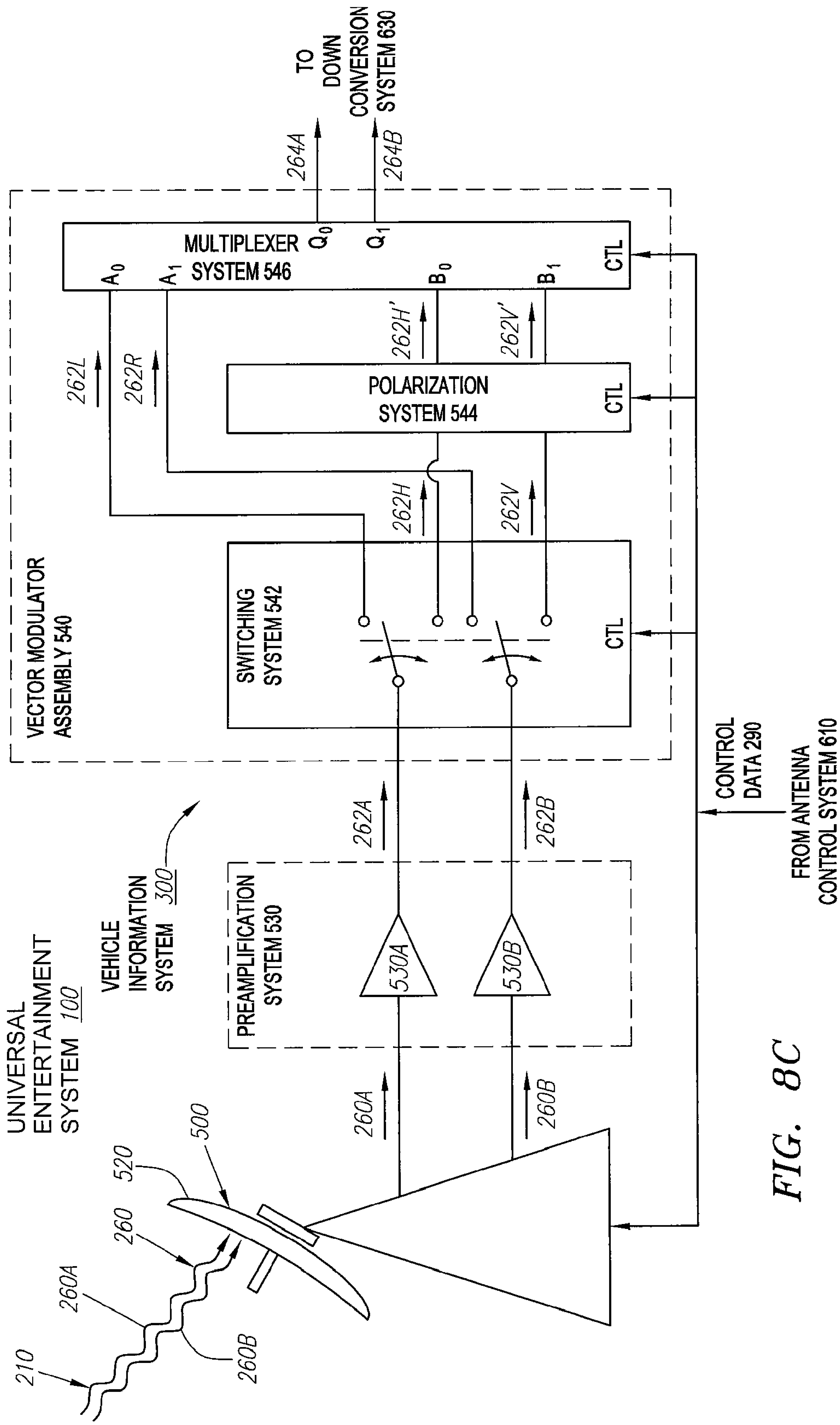

TO DOWN CONVERSION SYSTEM 630
264A
264B
MULTIPLEXER SYSTEM 546
Q_0
Q_1
A_0
A_1
B_0
B_1
CTL
262L
262R
262H'
262V'
POLARIZATION SYSTEM 544
262H
262V
VECTOR MODULATOR ASSEMBLY 540
SWITCHING SYSTEM 542
CONTROL DATA 290
FROM ANTENNA CONTROL SYSTEM 610
UNIVERSAL ENTERTAINMENT SYSTEM 100
VEHICLE INFORMATION SYSTEM 300
PREAMPLIFICATION SYSTEM 530
530A
530B
262A
262B
260A
260B
260
520
500
210

FIG. 8C

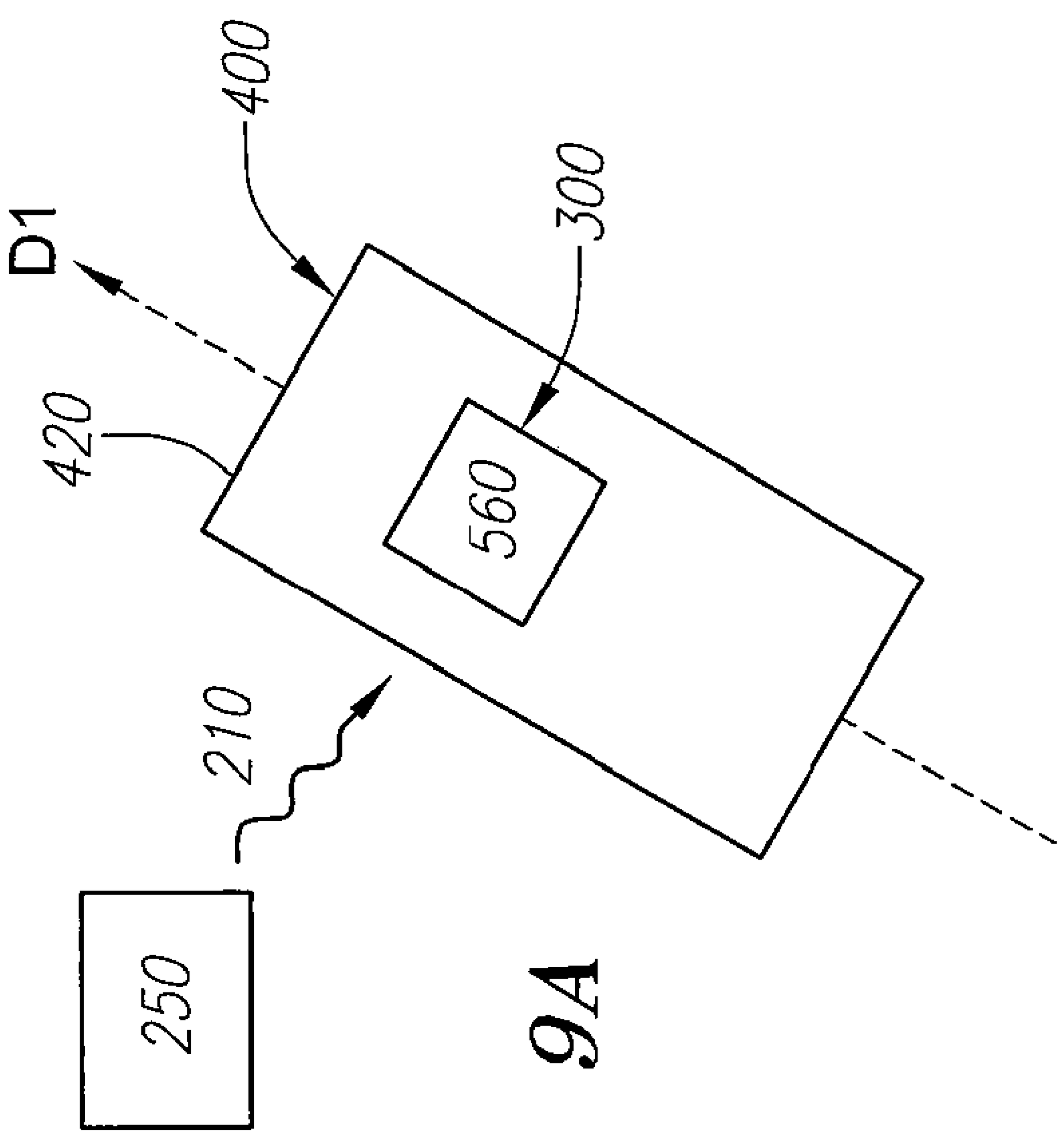


FIG. 9A

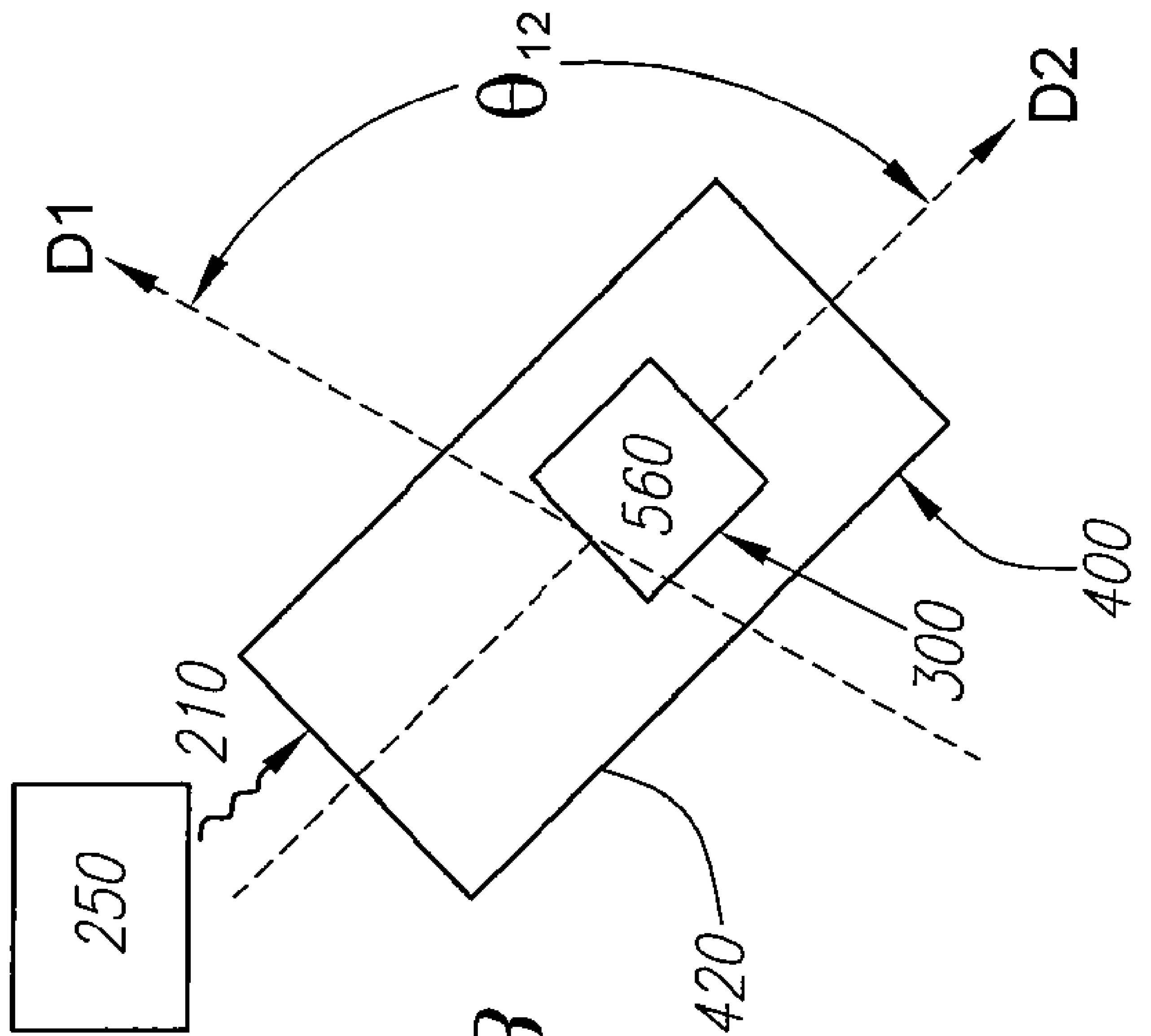


FIG. 9B

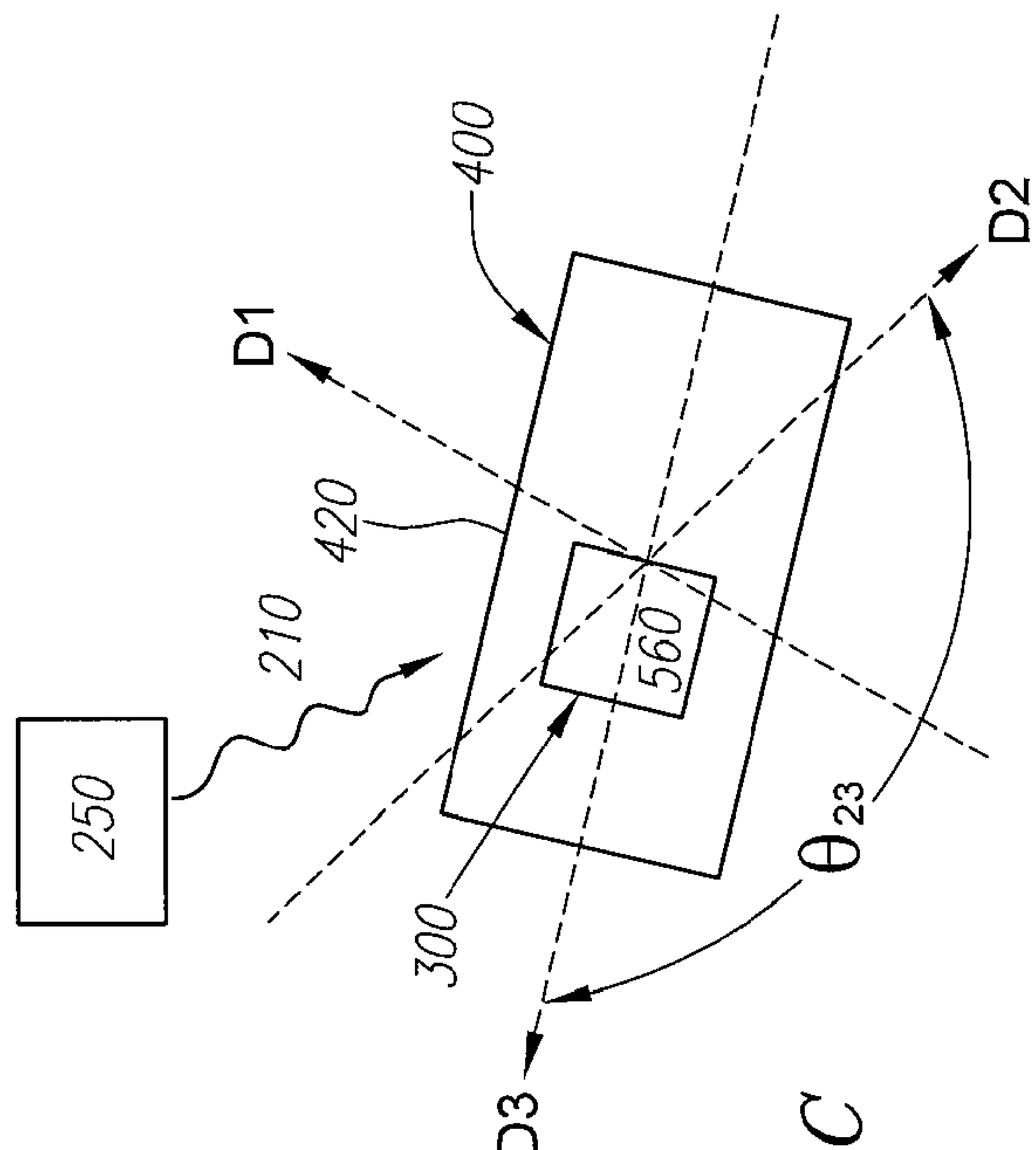


FIG. 9C

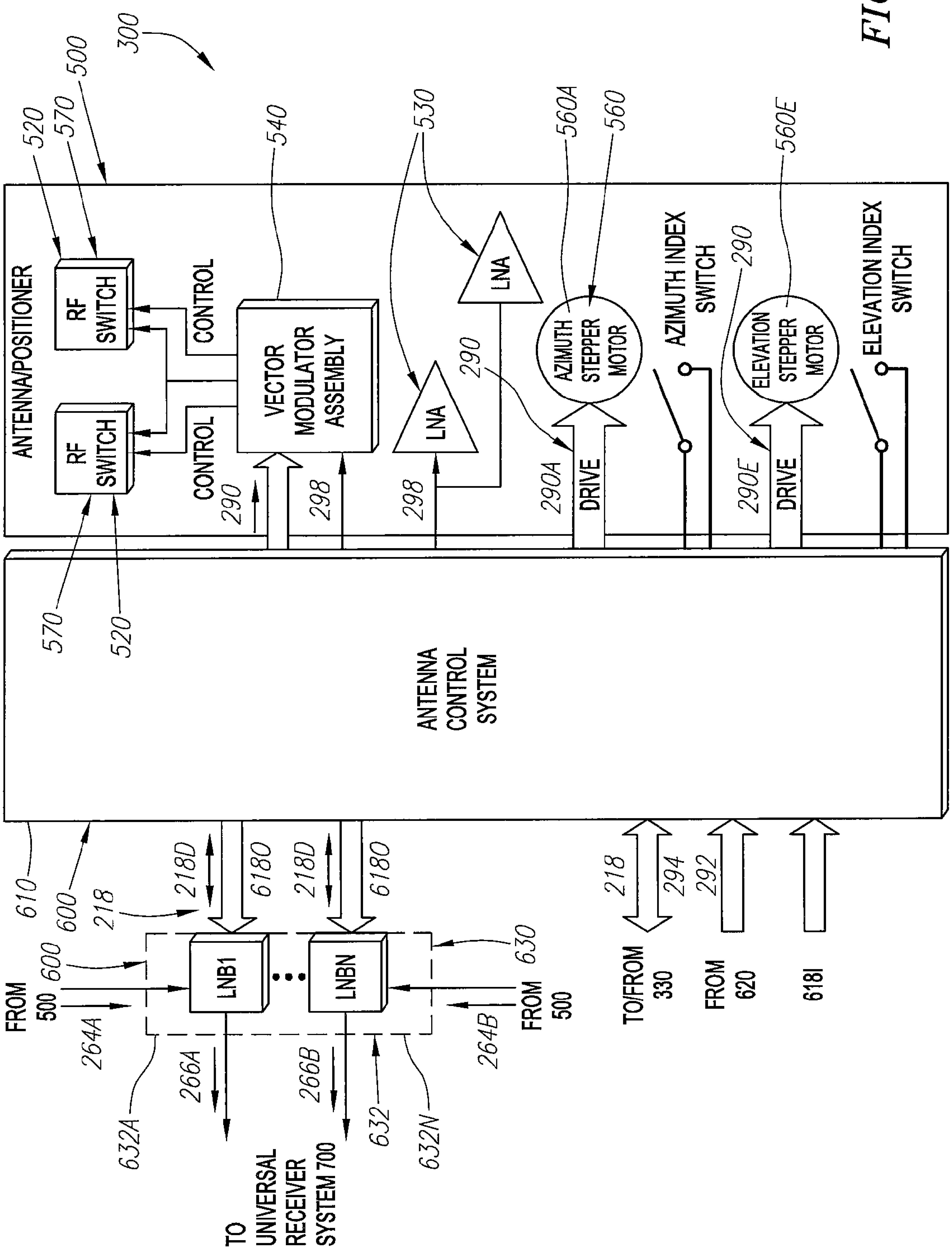

300
500
570
520
540
530
560A
560
560E
ANTENNA/POSITIONER
RF SWITCH
RF SWITCH
CONTROL
CONTROL
VECTOR MODULATOR ASSEMBLY
LNA
LNA
AZIMUTH STEPPER MOTOR
AZIMUTH INDEX SWITCH
ELEVATION STEPPER MOTOR
ELEVATION INDEX SWITCH
290
290
290
290A
290E
DRIVE
DRIVE
298
298
570
520
ANTENNA CONTROL SYSTEM
610
600
218
218D
618O
218D
618O
218
294
292
TO/FROM 330
FROM 620
618I
FROM 500
600
264A
LNB1
LNBN
630
FROM 500
264B
632A
266A
266B
632
632N
TO UNIVERSAL RECEIVER SYSTEM 700

FIG. 10A

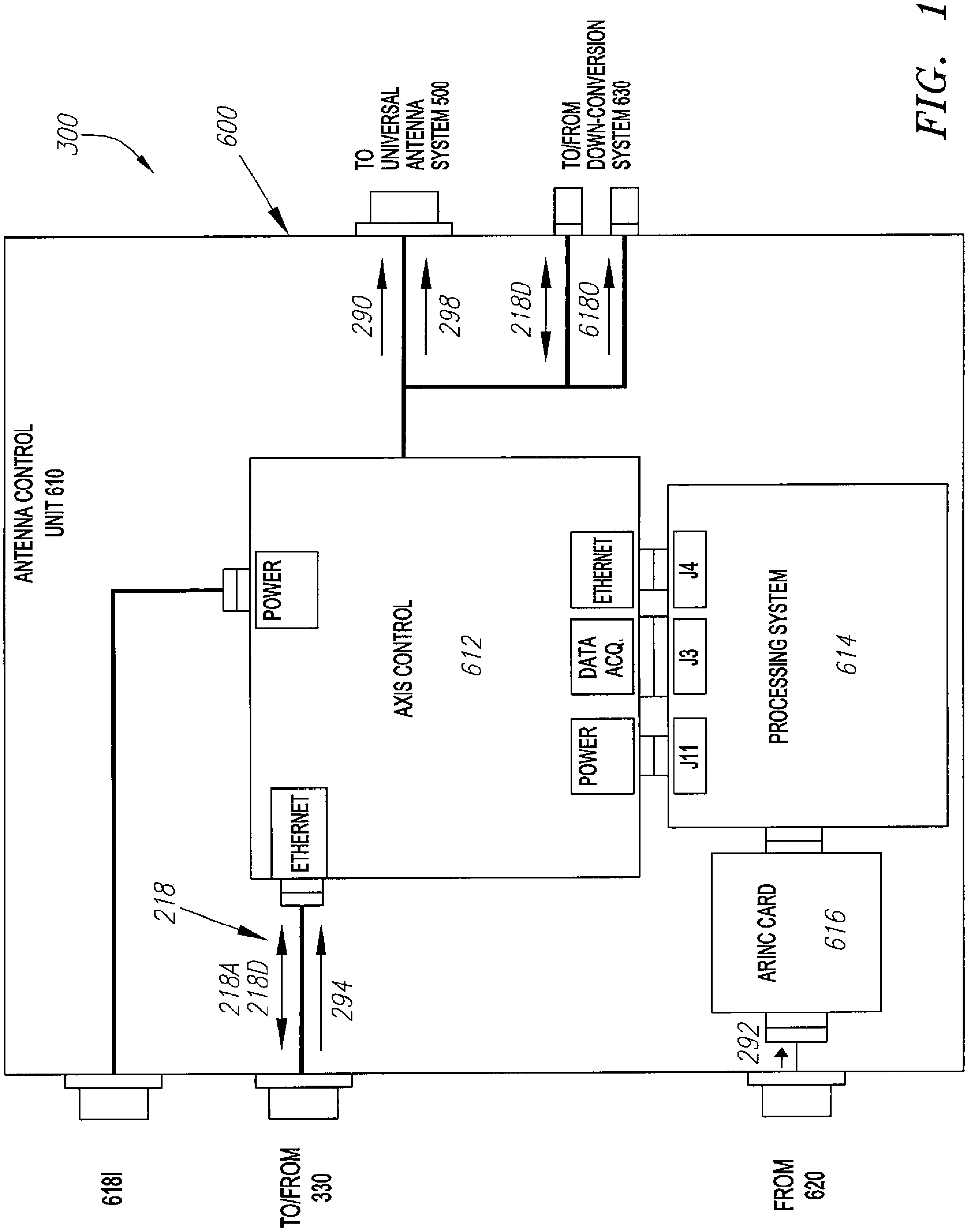

300
600
TO
UNIVERSAL
ANTENNA
SYSTEM 500
TO/FROM
DOWN-CONVERSION
SYSTEM 630
ANTENNA CONTROL
UNIT 610
290
298
218D
618O
POWER
AXIS CONTROL
612
ETHERNET
DATA
ACQ.
POWER
J4
J3
J11
PROCESSING SYSTEM
614
ETHERNET
ARINC CARD
616
218
218A
218D
294
292
618I
TO/FROM
330
FROM
620

FIG. 10B

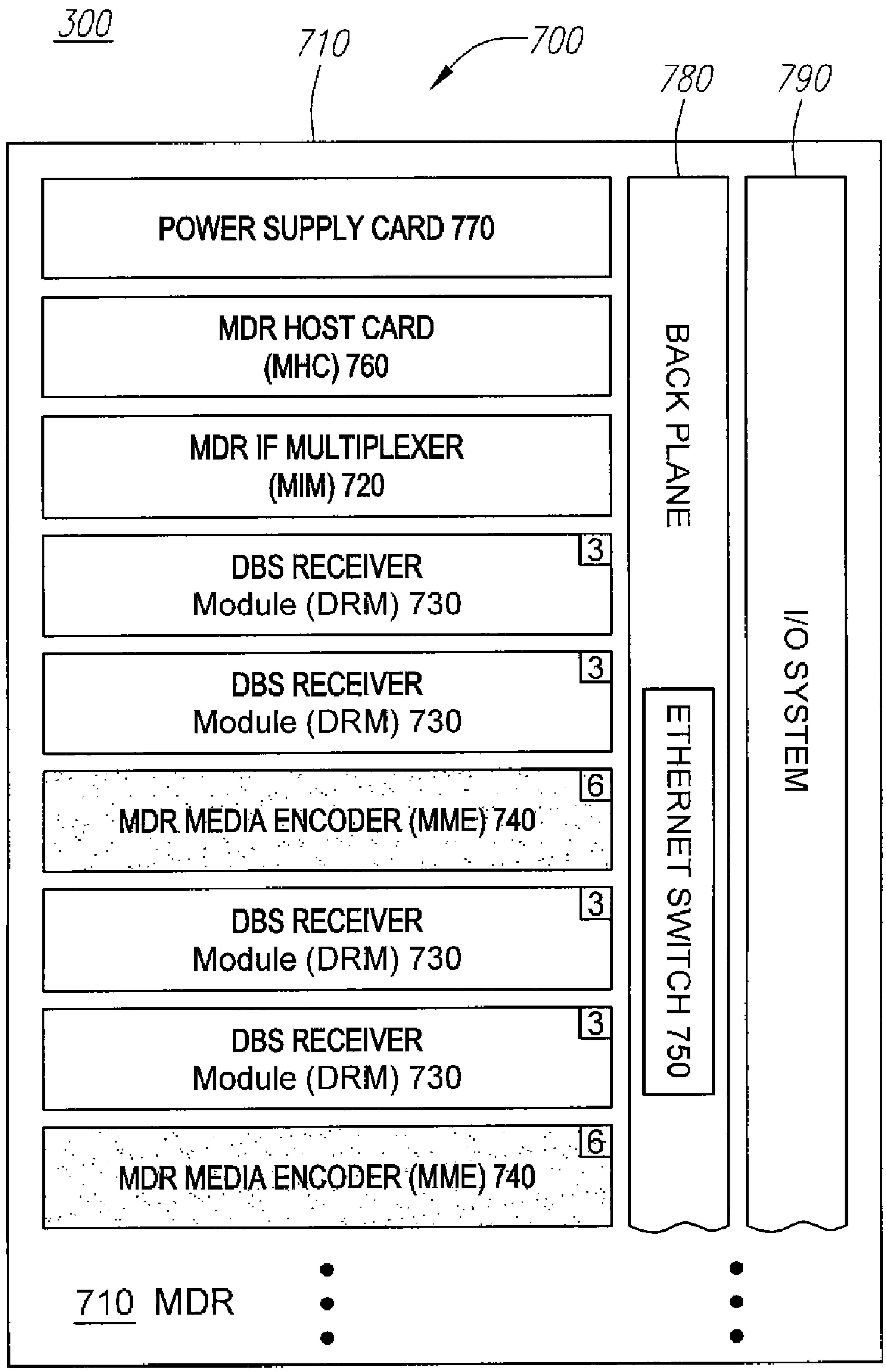

300
710
700
780
790
POWER SUPPLY CARD 770
MDR HOST CARD
(MHC) 760
MDR IF MULTIPLEXER
(MIM) 720
DBS RECEIVER
Module (DRM) 730
3
DBS RECEIVER
Module (DRM) 730
3
MDR MEDIA ENCODER (MME) 740
6
DBS RECEIVER
Module (DRM) 730
3
DBS RECEIVER
Module (DRM) 730
3
MDR MEDIA ENCODER (MME) 740
6
BACK PLANE
ETHERNET SWITCH 750
I/O SYSTEM
710 MDR

FIG. 11A

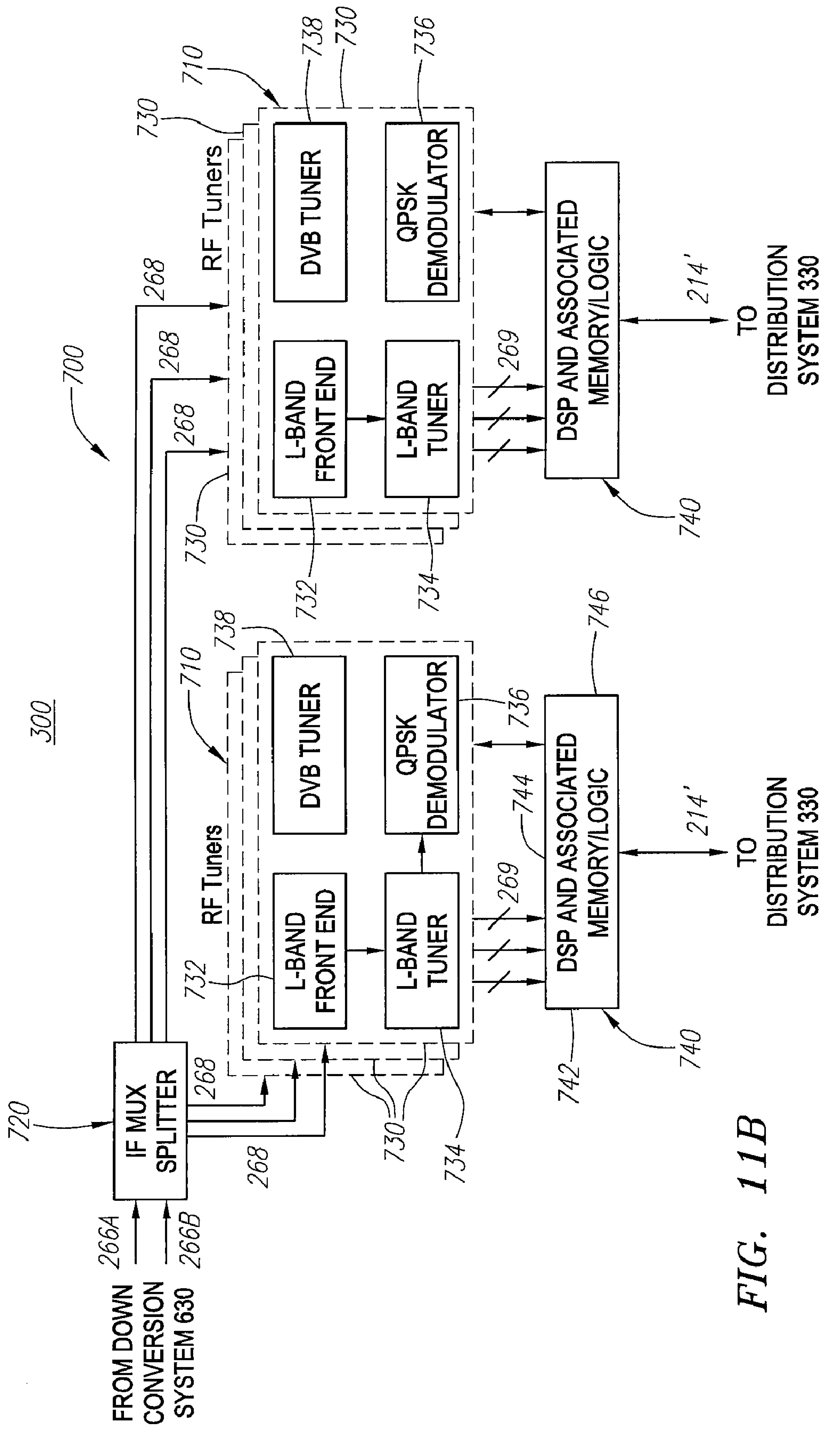

300
700
710
720
730
732
734
736
738
740
742
744
746
268
269
214'
266A
266B
FROM DOWN CONVERSION SYSTEM 630
IF MUX SPLITTER
RF Tuners
DVB TUNER
QPSK DEMODULATOR
L-BAND FRONT END
L-BAND TUNER
DSP AND ASSOCIATED MEMORY/LOGIC
TO DISTRIBUTION SYSTEM 330

FIG. 11B

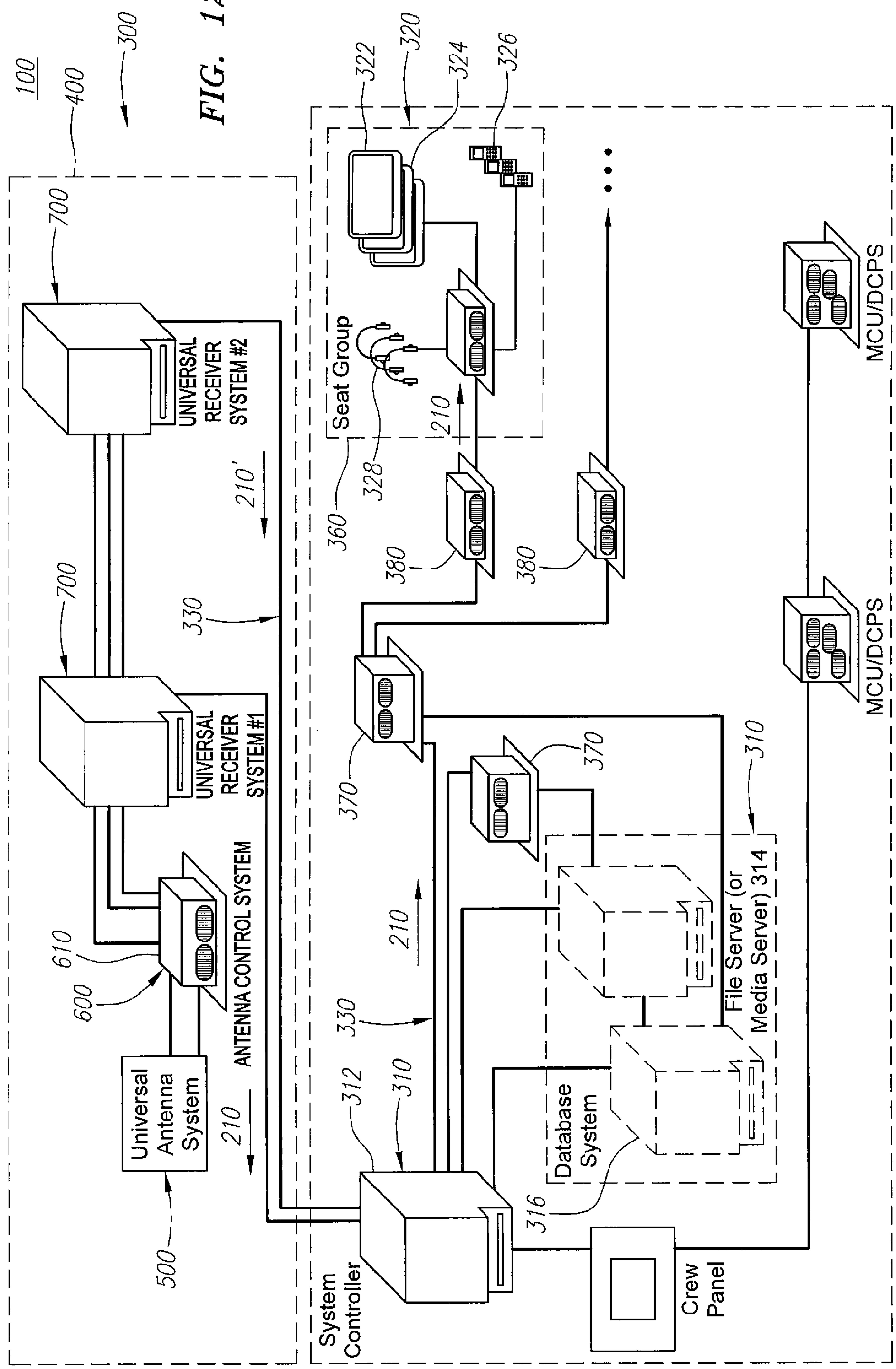

100
400
300
700
UNIVERSAL RECEIVER SYSTEM #2
UNIVERSAL RECEIVER SYSTEM #1
ANTENNA CONTROL SYSTEM
610
600
Universal Antenna System
500
210
210'
330
320
322
324
326
Seat Group
328
360
380
370
310
312
316
314
File Server (or Media Server) 314
Database System
System Controller
Crew Panel
MCU/DCPS

FIG. 12

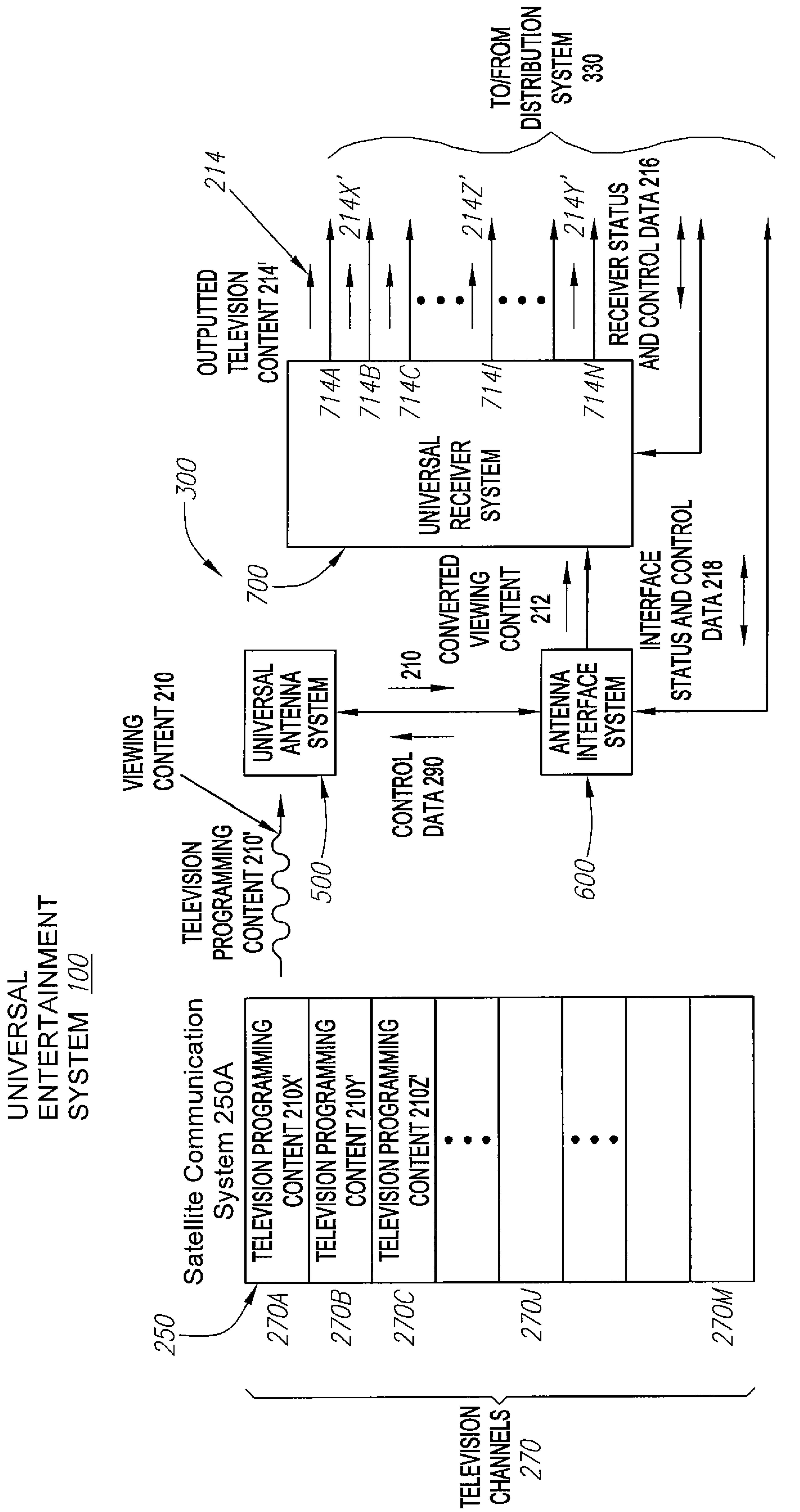

UNIVERSAL ENTERTAINMENT SYSTEM 100
Satellite Communication System 250A
250
TELEVISION PROGRAMMING CONTENT 210X'
TELEVISION PROGRAMMING CONTENT 210Y'
TELEVISION PROGRAMMING CONTENT 210Z'
270A
270B
270C
270J
270M
TELEVISION CHANNELS 270
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
500
UNIVERSAL ANTENNA SYSTEM
CONTROL DATA 290
210
ANTENNA INTERFACE SYSTEM
600
CONVERTED VIEWING CONTENT 212
INTERFACE STATUS AND CONTROL DATA 218
300
700
UNIVERSAL RECEIVER SYSTEM
714A
714B
714C
714I
714N
OUTPUTTED TELEVISION CONTENT 214'
214
214X'
214Z'
214Y'
RECEIVER STATUS AND CONTROL DATA 216
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 13A

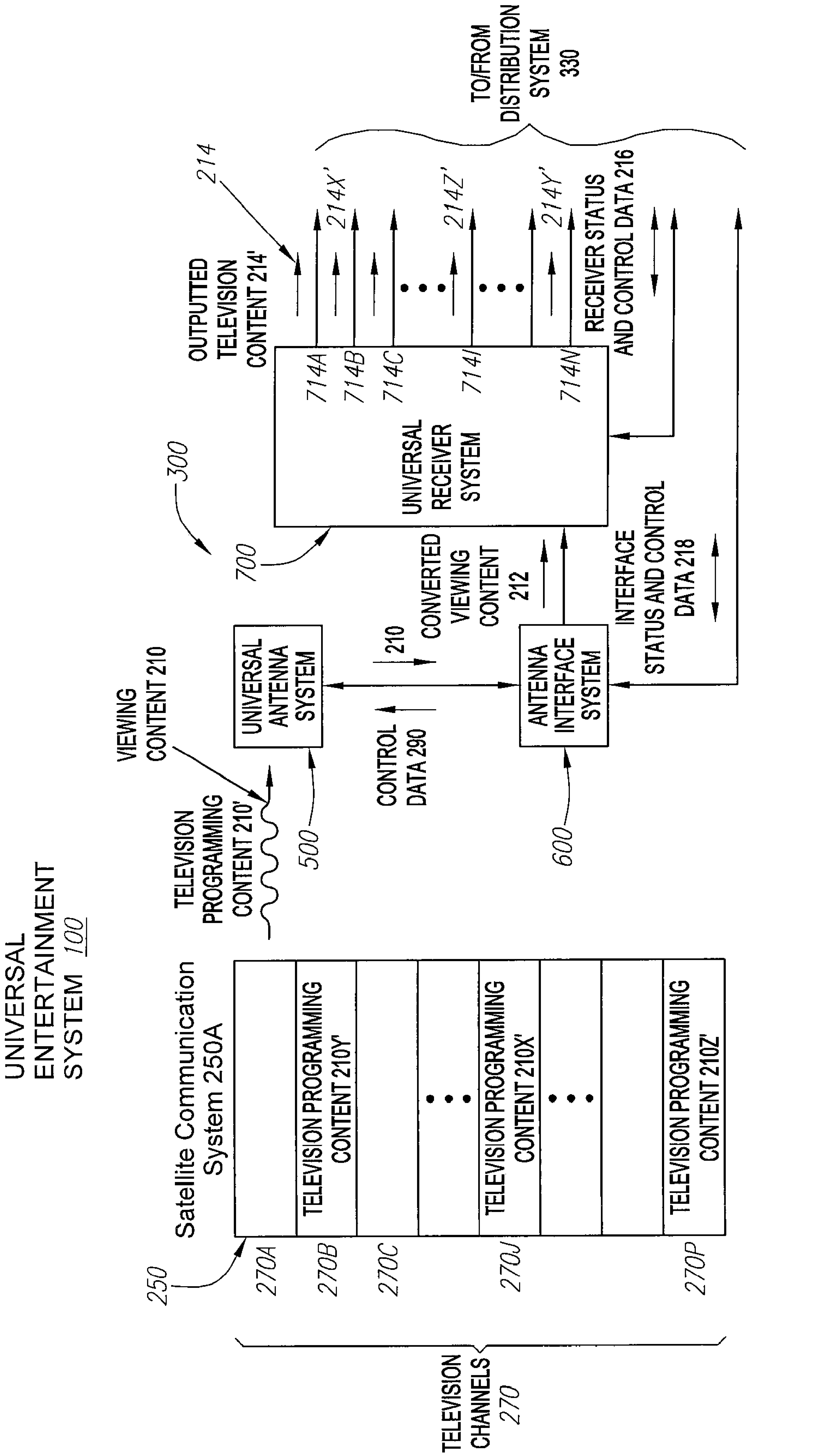

UNIVERSAL ENTERTAINMENT SYSTEM 100
Satellite Communication System 250A
250
270A
270B
270C
270J
270P
TELEVISION PROGRAMMING CONTENT 210Y'
TELEVISION PROGRAMMING CONTENT 210X'
TELEVISION PROGRAMMING CONTENT 210Z'
TELEVISION CHANNELS 270
TELEVISION PROGRAMMING CONTENT 210'
VIEWING CONTENT 210
UNIVERSAL ANTENNA SYSTEM
500
CONTROL DATA 290
210
ANTENNA INTERFACE SYSTEM
600
CONVERTED VIEWING CONTENT 212
INTERFACE STATUS AND CONTROL DATA 218
UNIVERSAL RECEIVER SYSTEM
300
700
714A
714B
714C
714I
714N
OUTPUTTED TELEVISION CONTENT 214'
214
214X'
214Z'
214Y'
RECEIVER STATUS AND CONTROL DATA 216
TO/FROM DISTRIBUTION SYSTEM 330

FIG. 13B

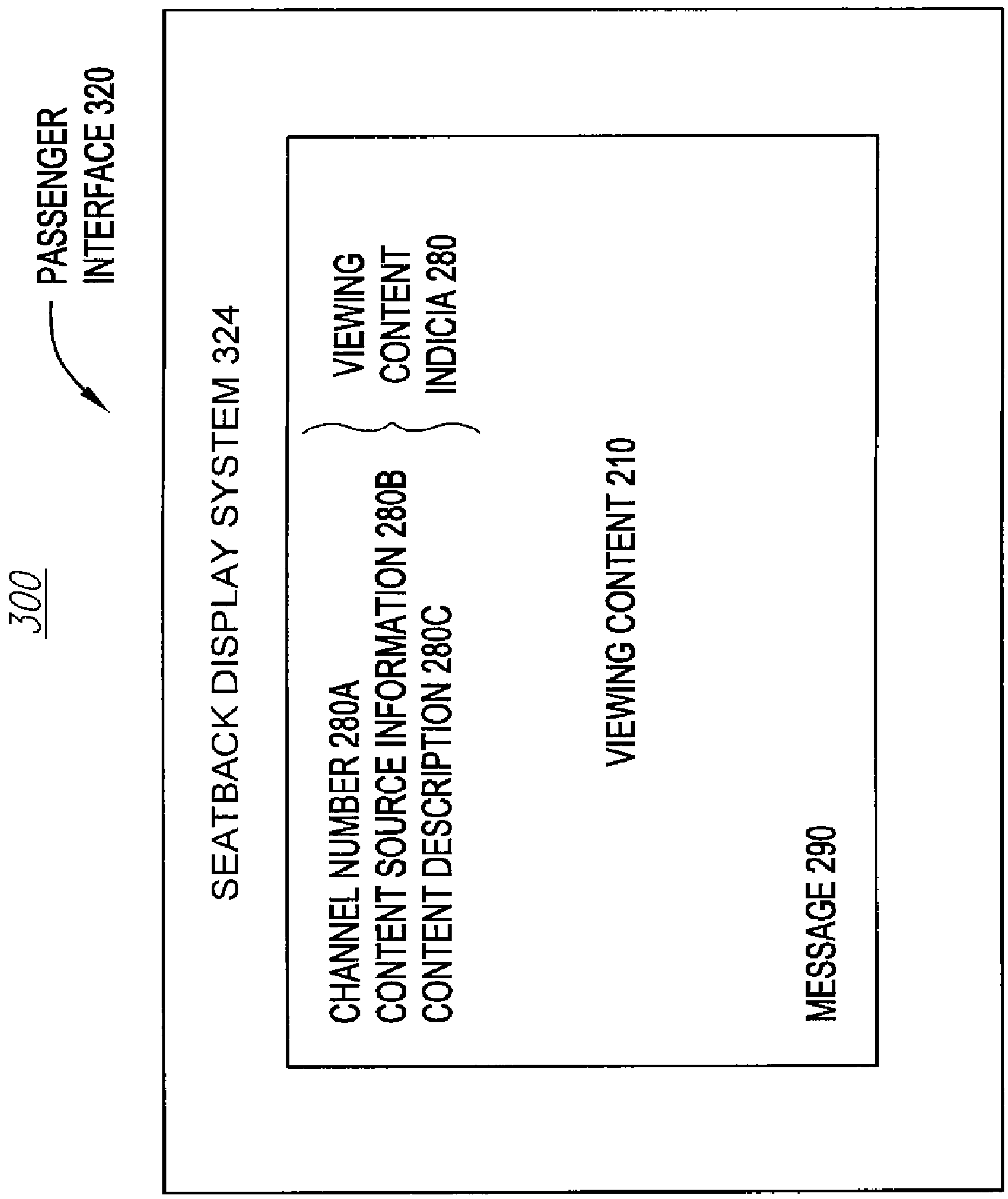

300
PASSENGER INTERFACE 320
SEATBACK DISPLAY SYSTEM 324
CHANNEL NUMBER 280A
CONTENT SOURCE INFORMATION 280B
CONTENT DESCRIPTION 280C
VIEWING CONTENT INDICIA 280
VIEWING CONTENT 210
MESSAGE 290

FIG. 14

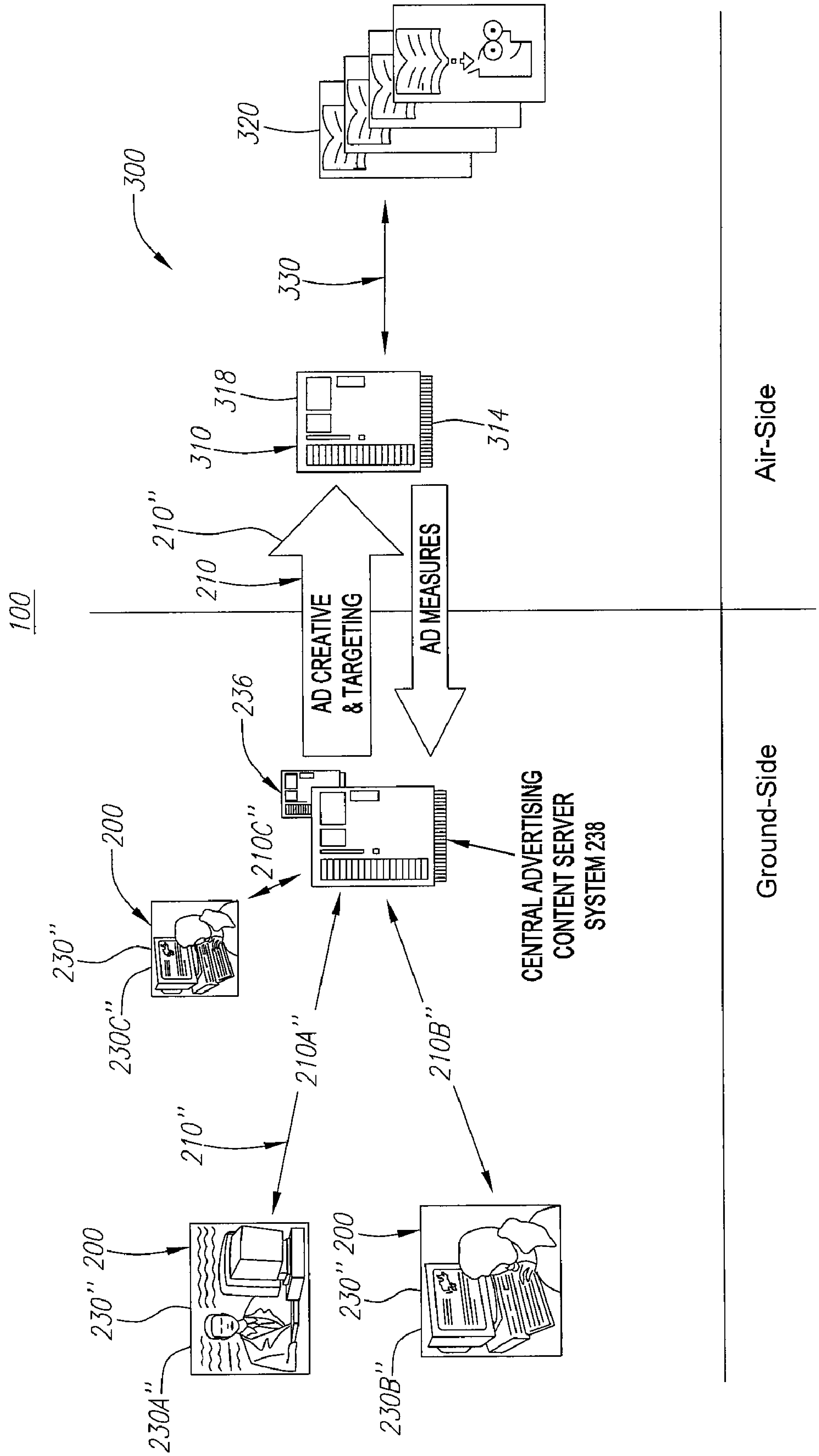

300
320
330
318
310
314
210''
210
100
AD CREATIVE & TARGETING
AD MEASURES
Air-Side
Ground-Side
236
200
210C''
230''
230C''
CENTRAL ADVERTISING CONTENT SERVER SYSTEM 238
210A''
210B''
210''
230'' 200
230A''
230'' 200
230B''

FIG. 15

SYSTEM AND METHOD FOR RECEIVING BROADCAST CONTENT ON A MOBILE PLATFORM DURING INTERNATIONAL TRAVEL

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to a U.S. provisional patent application, Ser. No. 60/625,497, filed on Nov. 5, 2004. Priority to the provisional application is expressly claimed, and the disclosure of the provisional application is hereby incorporated by reference in its entirety.

FIELD

The present disclosure relates generally to portable information systems and more particularly, but not exclusively, to passenger entertainment systems installed aboard mobile platforms.

BACKGROUND

Passenger vehicles, such as automobiles and aircraft, often provide entertainment systems to satisfy passenger demand for entertainment during travel.

Conventional passenger entertainment systems typically include video display systems, such as overhead cabin display systems or seatback display systems, and audio presentation systems, such as overhead speaker systems or headphones, for presenting viewing content. Individual controls also can be provided at the passenger seats for selecting viewing content for presentation. Including audio and video materials, the viewing content can be derived from a variety of content sources. For example, prerecorded viewing content, such as motion pictures and music, can be provided by internal sources, such as audio and video players, that are installed in the vehicle. The conventional passenger entertainment systems likewise can include antenna and receiver systems for receiving viewing content, such as live television programming, transmitted from one or more external content providers (or sources).

Such conventional passenger entertainment systems, however, suffer from many disadvantages. Installation of conventional passenger entertainment systems, for instance, can involve the addition of a significant amount of weight to the vehicle. The fuel economy of the vehicle thereby can be adversely affected. Also, conventional passenger entertainment systems provide limited viewing content and limited communications between the vehicle and the external content sources, particularly during travel.

When installed on vehicles, such as aircraft, that travel internationally, conventional passenger entertainment systems further require frequent adjustments or changes during travel. If the passenger entertainment system has an antenna system for receiving direct broadcast satellite (DBS) television programming, for example, the antenna system must be adjusted or replaced with a different antenna system upon entering each new geographic region to receive viewing content within the new geographic region. The need to make adjustments or changes to the antenna system is not only inconvenient for vehicle operators, but also to the passengers by disrupting reception of the viewing content and causing unwanted travel delays.

In view of the foregoing, a need exists for an improved passenger entertainment system that overcomes the aforementioned obstacles and deficiencies of currently-available passenger entertainment systems.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exemplary top-level block diagram illustrating an embodiment of a universal entertainment system wherein the universal entertainment system includes a vehicle information system for receiving and selectably presenting viewing content provided by one or more content sources.

FIG. **2**A is an exemplary block diagram illustrating an embodiment of the universal entertainment system of FIG. **1** in which the vehicle information system is installed in an automobile.

FIG. **2**B is an exemplary block diagram illustrating an alternative embodiment of the universal entertainment system of FIG. **1** in which the vehicle information system is installed in an aircraft.

FIG. **3** is an exemplary top-level block diagram illustrating another alternative embodiment of the universal entertainment system of FIG. **1**, wherein at least one content source comprises a television source for providing television programming content via a satellite communication system.

FIG. **4** is a detail drawing illustrating exemplary coverage regions for a plurality of satellite communication systems, wherein each coverage region has one or more contour boundary based upon signal strength.

FIG. **5** is an exemplary top-level block diagram illustrating still another alternative embodiment of the universal entertainment system of FIG. **1**, wherein the vehicle information system includes a universal antenna system and a universal receiver system for receiving the viewing content from the content source via a satellite communication system.

FIG. **6**A is an exemplary block diagram illustrating an embodiment of the universal entertainment system of FIG. **5**, wherein the vehicle information system includes an antenna control system for directing the satellite communication system toward the satellite communication system and a down-conversion system for converting the viewing content into a form suitable for distribution throughout the vehicle information system.

FIG. **6**B is an exemplary block diagram illustrating an alternative embodiment of the universal entertainment system of FIG. **6**A, wherein the antenna control system directs the satellite communication system toward the satellite communication system based upon a comparison of vehicle position data and satellite position data.

FIG. **6**C is an exemplary block diagram illustrating another alternative embodiment of the universal entertainment system of FIG. **6**A, wherein the antenna control system directs the satellite communication system toward the satellite communication system based upon a feedback control signal provided by the down-conversion system.

FIG. **7** is a detail drawing illustrating an alternative embodiment of the vehicle information system of FIG. **5**, wherein the universal receiver system comprises a plurality of receiver modules for selecting the viewing content to be available for distribution throughout the vehicle information system.

FIG. **8**A is an exemplary block diagram illustrating representative primary functional components of an embodiment of the universal antenna system of the vehicle information system of FIG. **7**.

FIG. **8**B is a detail drawing illustrating an alternative embodiment of the universal antenna system of FIG. **8**A, wherein the universal antenna system is configured for installation aboard an aircraft.

FIG. **8**C is an exemplary block diagram illustrating another alternative embodiment of the universal antenna system of FIG. **8**A, wherein the universal antenna system is configurable to receive oppositely-polarized direct broadcast satellite (DBS) signals.

FIGS. **9**A-C illustrate a method for calibrating the universal antenna system and the universal receiver system for receiving the viewing content from a preselected satellite communication system.

FIG. **10**A is an exemplary block diagram illustrating an embodiment of an antenna control system for the universal antenna system of FIG. **7**.

FIG. **10**B is a detail drawing illustrating an alternative embodiment of the antenna control system of FIG. **10**A, wherein the antenna control system includes an axis control system.

FIG. **11**A is an exemplary block diagram illustrating representative primary functional components of an embodiment of the universal receiver system of the vehicle information system of FIG. **7**.

FIG. **11**B is a detail drawing illustrating an alternative embodiment of the universal receiver system of FIG. **11**A, wherein the universal receiver system includes a plurality of tuner systems for selecting the received viewing content for distribution within, and presentation by, the vehicle information system.

FIG. **12** is an exemplary block diagram illustrating an embodiment of the vehicle information system of FIG. **7**, wherein the vehicle information system is configured for distributing the viewing content to passenger seats within the aircraft.

FIG. **13**A is an exemplary block diagram illustrating another alternative embodiment of the vehicle information system of FIG. **5**, wherein viewing content from selected content providers on selected channels of the vehicle information system.

FIG. **13**B is an exemplary block diagram illustrating an alternative embodiment of the vehicle information system of FIG. **13**A, wherein the viewing content from the selected content providers continues to be provided on the selected channels as the vehicle information system travels between coverage regions of satellite communication systems.

FIG. **14** is a detail drawing illustrating another alternative embodiment of the vehicle information system of FIG. **5**, wherein the vehicle information system can present viewing content indicia associated with the viewing content via the passenger interfaces.

FIG. **15** is an exemplary block diagram illustrating another alternative embodiment of the universal entertainment system of FIG. **5**, wherein at least one content source includes an advertising content source for providing advertising content to the vehicle information system.

It should be noted that the figures are not drawn to scale and that elements of similar structures or functions are generally represented by like reference numerals for illustrative purposes throughout the figures. It also should be noted that the figures are only intended to facilitate the description of the preferred embodiments of the present disclosure. The figures do not describe every aspect of the present disclosure and do not limit the scope of the disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Since currently-available entertainment systems require periodic adjustment during travel through diverse geographical regions, a universal entertainment system for providing reception of viewing content with limited interruption in service during international travel can prove desirable and provide a basis for a wide range of entertainment system applications, such as passenger entertainment systems for use on aircraft and other types of vehicles. This result can be achieved, according to one embodiment disclosed herein, by employing a universal entertainment system **100** as shown in FIG. **1**.

The universal entertainment system **100** illustrated in FIG. **1** includes one or more content sources **200** and at least one vehicle information system **300**. Each content source **200** provides viewing content **210** and has a predetermined coverage region **220**. When the vehicle information system **300** is within the coverage region **220** of a selected content source **200**, the vehicle information system **300** can receive the viewing content **210** provided by the selected content source **200**. The vehicle information system **300** can pass through the coverage regions **220** of more than one of the content sources **200** during travel, particularly during international travel. For example, the vehicle information system **300** is shown as being within the coverage region **220**A of the content source **200**A and as receiving viewing content **210**A. The vehicle information system **300** can subsequently leave the coverage region **220**A of the content source **200**A and/or enter the coverage region **220**B of the content source **200**B. If leaving the coverage region **220**A and entering the coverage region **220**B, the vehicle information system **300** advantageously can automatically switch from receiving the viewing content **210**A to receiving the viewing content **210**B with limited interruption in service.

Each content source **200** can be provided in any conventional manner, such as via one or more hardware components and/or software components, and can be disposed proximately to, and/or remotely from, the vehicle information system **300**. For example, the content source **200** can be provided in the manner set forth in the co-pending U.S. patent applications, entitled "SYSTEM AND METHOD FOR DOWNLOADING FILES," Ser. No. 10/772,565, filed on Feb. 4, 2004; entitled "SYSTEM AND METHOD FOR MANAGING CONTENT ON MOBILE PLATFORMS," Ser. No. 11/123,327, filed on May 6, 2005; and entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005, which are assigned to the assignee of the present application and the respective disclosures of which are hereby incorporated herein by reference in their entireties.

The viewing content **210** can comprise any suitable type of viewing content **210**, such as stored (or time-delayed) viewing content and/or live (or real-time) viewing content, in the manner set forth in the above-referenced co-pending U.S. patent applications, entitled "SYSTEM AND METHOD FOR DOWNLOADING FILES," Ser. No. 10/772,565, filed on Feb. 4, 2004, and entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005. As desired, the viewing content **210** can include geographical information in the manner set forth in U.S. Pat. No. 6,661,353, entitled "METHOD FOR DISPLAYING INTERACTIVE FLIGHT MAP INFORMATION," which is assigned to the assignee of the present application and the disclosure of which is hereby incorporated herein by reference in its entirety. In addition to entertainment content, such as live satellite television programming and/or live satellite radio programming, the viewing content **210** preferably can include two-way communications such as real-time Internet access and/or telecommunications in the manner set forth in U.S. Pat. No. 5,568,484, entitled "TELECOMMUNICATIONS SYSTEM AND METHOD FOR USE ON COMMERCIAL AIRCRAFT AND OTHER VEHICLES," which is assigned to the assignee of the present application and the disclosure of which is hereby incorporated herein by reference in its entirety.

Being configured to receive the viewing content **210** from the content sources **200**, the vehicle information system **300** can communicate with the content sources **200** in any conventional manner, preferably via wireless communications. Turning to FIGS. **2**A-B, the vehicle information system **300** is illustrated as being associated with a vehicle **400** and can comprise any suitable type of mobile conventional entertainment system, such as a passenger entertainment system, in the manner set forth in the above-referenced co-pending U.S. patent applications, entitled "SYSTEM AND METHOD FOR DOWNLOADING FILES," Ser. No. 10/772,565, filed on Feb. 4, 2004, and entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005, as well as the co-pending U.S. patent application, entitled "SYSTEM AND METHOD FOR PRESENTING HIGH-QUALITY VIDEO TO PASSENGERS ON A MOBILE PLATFORM," Ser. No. 60/673,171, filed on Apr. 19, 2005, the disclosure of which is hereby incorporated herein by reference in its entirety.

The vehicle information system **300** preferably is configured to be installed on a wide variety of vehicles **500**. Exemplary types of vehicles can include an automobile **410** (shown in FIG. **2**A), an aircraft **420** (shown in FIG. **2**B), a bus, a recreational vehicle, a boat, and/or a locomotive, without limitation. If installed on an aircraft **420** as illustrated in FIG. **2**B, for example, the vehicle information system **300** can comprise a conventional aircraft passenger in-flight entertainment system, such as the Series 2000, 3000, eFX, and/or eX2 in-flight entertainment system as manufactured by Panasonic Avionics Corporation (formerly known as Matsushita Avionics Systems Corporation) of Lake Forest, Calif.

As shown in FIGS. **2**A-B, the vehicle information system **300** includes an antenna system **340** and a transceiver system **350** for receiving the viewing content **210** from the content sources **200**. The antenna system **340** preferably is disposed outside the vehicle **400**, such as an exterior surface **440** of a fuselage **430** of the aircraft **420**. The vehicle information system **300** likewise can include at least one conventional server system **310**. Configurable in any suitable manner, including as a central server system and/or a distributed server system, the server system **310** can include an information system controller **312** (shown in FIG. **7**) for providing overall system control functions for the vehicle information systems **300** and/or at least one media (or file) server system **314** (shown in FIG. **12**) for storing preprogrammed content and/or the received viewing content **210**, as desired. The server system **310** can include, and/or communicate with, one or more conventional peripheral media storage systems (not shown), including optical media devices, such as a digital video disk (DVD) system and/or a compact disk (CD) system, and or magnetic media systems, such as a video cassette recorder (VCR) system and/or a hard disk drive (HDD) system, of any suitable kind, for storing preprogrammed content and/or the received viewing content **210**.

One or more passenger interfaces **320** are provided for selecting preprogrammed content and/or the received viewing content **210** and for presenting the selected preprogrammed content and/or viewing content **210**. As desired, the passenger interfaces **320** can comprise conventional passenger interfaces and can be provided in the manner set forth in the above-referenced co-pending U.S. patent application, entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005. Each passenger interface **320** can include a video interface system and/or an audio interface system. Overhead cabin display systems **322** (shown in FIG. **12**) with central controls, seatback display systems **324** (shown in FIG. **12**) with individualized controls, crew display panels **323** (shown in FIG. **12**), and/or handheld presentation systems **326** (shown in FIG. **12**) are exemplary video interface systems; whereas, illustrative conventional audio interface systems can be provided via the handheld presentation systems **326** and/or headphones **328** (shown in FIG. **12**). Passengers (not shown) who are traveling aboard the vehicle **400** thereby can enjoy the preprogrammed content and/or the received viewing content **210** during travel.

The antenna system **340** and the transceiver system **350** of the vehicle information system **300** is illustrated in FIGS. **2**A-B as communicating with the server system **310** and the passenger interfaces **320** via a distribution system **330**. The distribution system **330** can be provided in any conventional manner and is configured to support any conventional type of communications, including wired communications and/or wireless communications, as set forth in the above-referenced co-pending U.S. patent application, entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005. Preferably being distributed via high-speed data communications, the preprogrammed content and/or the received viewing content **210** can be distributed throughout the vehicle information system **300** in any suitable manner, including in the manner set forth in U.S. Pat. Nos. 5,596,647, 5,617,331, and 5,953,429, each entitled "INTEGRATED VIDEO AND AUDIO SIGNAL DISTRIBUTION SYSTEM AND METHOD FOR USE ON COMMERCIAL AIRCRAFT AND OTHER VEHICLES," the disclosures of which are hereby incorporated herein by reference in their entireties.

Turning to FIG. **3**, the content source preferably provides viewing content **210** to the vehicle information system **300** via one or more satellite communication systems **250**, such as a Ku-Band satellite communication system. For example, if the satellite communication system **250** comprises a direct broadcast satellite (DBS) television system, the viewing content **210** can include real-time (or live) television programming content **210'** provided by one or more television sources **230** as illustrated in FIG. **3**. Each television source **230** can comprise a regional television content provider, such as an established television network and/or a provider of specialized television programming, that provides at least one channel of television programming content **210'** to residences **240** within a selected geographical region. In addition to providing the television programming content **210'** to the residences **240** via one or more broadcast television systems **232** and/or cable television systems **234**, the television source **230** likewise can provide the television programming content **210'** to an uplink system **236** for distribution via at least one satellite communication system **250**, each comprising one or more satellites (not shown).

By distributing the television programming content **210'** via the satellite communication system **250**, the television programming content **210'** can be provided with digital quality video and audio. For example, the uplink system **236** can convert the television programming content **210'** into a digital format, such as a Moving Picture Experts Group (MPEG-1, MPEG-2, MPEG-4) transport stream, and broadcast via Digital Video Broadcasting (DVB) satellite television programming. The television programming content **210'** thereby can be provided throughout the broad coverage region **220** (shown in FIG. **1**) of the satellite communication system **250**. As shown in FIG. **4**, exemplary coverage regions **220** can include Australia, Europe, Middle East, Africa, Asia, Japan, Latin America, South America, and/or North America, in whole and/or in part.

The exemplary coverage regions **220** illustrated in FIG. **4** can include one or more coverage regions **220** that are substantially separate (or do not overlap) and/or one or more coverage regions **220** that at least partially overlap. For example, the coverage regions **220**W and **220**X are shown in FIG. **4** as being substantially separate coverage regions **220**; whereas, the coverage regions **220**Y and **220**Z are illustrated as being at least partially overlapping coverage regions **220**. Each coverage region **200** likewise can have at least one contour boundary **222** based upon signal strength (or signal power level). It will be appreciated that the signal strength of the television programming content **210'** (shown in FIG. **3**) decreases as the distance from the relevant satellite communication system **250** (shown in FIG. **3**) increases. The coverage region **220**X, for instance, is shown as having two illustrative contour boundaries **222**A, **222**B, wherein the minimum power level of the television programming content **210'** within the smaller contour boundary **222**A is greater than the minimum power level of the television programming content **210'** within the larger contour boundary **222**B.

Returning to FIG. **3**, the vehicle information system **300** can be configured to receive, and selectably present, the viewing content **210** provided via the satellite communication systems **250**. As shown in FIG. **3**, the viewing content **210** available to the vehicle information system. **300** can include the television programming content **210'**. The vehicle information system **300** thereby can advantageously utilize existing satellite communication systems **250** that currently are used to provide the television programming content **210'** to the residences **240**. Therefore, passengers can enjoy digital-quality television programming content **210'** during travel, including international travel, that is based upon the same television programming content **210'** that is available in their homes.

As desired, the television programming content **210'** can include "free-to-air" (or unencrypted) content and/or premium (or encrypted) content. "Free-to-air" content is television programming content **210'** that is not encrypted and that is broadcast free of charge to viewers within selected geographical regions, such as Europe and Middle East; whereas, premium content is encrypted content that is available for viewing upon payment of a fee to the television source **230**. In the manner set forth in the above-referenced co-pending U.S. patent applications, entitled "SYSTEM AND METHOD FOR DOWNLOADING FILES," Ser. No. 10/772,565, filed on Feb. 4, 2004, and entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005, the passenger interfaces **320** (shown in FIGS. **2**A-B) can be separated into a plurality of interface groups. Illustrative interface groups can include types of passenger seat groups **360** (shown in FIG. **12**) and/or types of passenger groups aboard the vehicle **400** (shown in FIGS. **2**A-B).

If the passenger interfaces **320** are associated with types of passengers traveling on board the vehicle **400**, such as vehicle crew, premium-class (or first-class) passengers, business-class passengers, and/or economy-class (or coach-class) passengers, the functionality of the passenger interfaces **320** within each interface group can be the same as, and/or differ from, the functionality of the passenger interfaces **320** within the other interface groups. As desired, the functionality of a selected passenger interface **320** can include the variety of viewing content **210** made available by the vehicle information system **300** to the selected passenger interface **320** for selection and presentation. For example, the passenger interfaces **320** associated with first-class passengers may permitted to select and view the "free-to-air" (or unencrypted) content and the premium (or encrypted) content; whereas, the passenger interfaces **320** associated with the-coach-class passengers can be limited to selections from the "free-to-air" content. Coach-class passengers can be permitted to access and view other "free-to-air" content and/or the premium content for a fee.

An illustrative embodiment of the vehicle information system **300** is shown in FIG. **5** wherein the antenna system **340** and the transceiver system **350** respectfully comprise a universal (or multi-regional) antenna system **500** and a universal receiver system **700**. Preferably being disposed under, and protected by, a radome **510** (shown in FIG. **8**A), the universal antenna system **500** can be configured to receive the viewing content **210** in the manner set forth above and communicates with the universal receiver system **700** via an antenna interface system **600**. Operating under the control of the server system **310** (shown in FIGS. **2**A-B), the antenna interface system **600** can exchange interface status and control data **218** with the information system controller **312** (shown in FIG. **7**) via the distribution system **330**. The information system controller **312** thereby can provide instruction for controlling the operation of the universal antenna system **500** via the interface status and control data **218**, and the antenna interface system **600**, upon receiving the interface status and control data **218**, can execute the instruction to control the universal antenna system **500** in accordance with the instruction provided by the information system controller **312**.

For example, as the vehicle **400** (shown in FIGS. **2**A-B) and, therefore, the vehicle information system **300** approach and/or enter the coverage region **220** (shown in FIG. **1**) of a relevant satellite communication system **250**, the information system controller **312** can provide interface status and control data **218** for reconfiguring the universal antenna system **500** to communicate with the satellite communication system **250**. Upon receiving the interface status and control data **218**, the antenna interface system **600** can reconfigure the universal antenna system **500**. The universal antenna system **500** thereby can automatically begin to receive the viewing content **210**, such as the television programming content **210'**, from the satellite communication system **250** as the vehicle enters the associated coverage region **220**. As desired, the universal antenna system **500** can maintain communication with the satellite communication system **250**, and continues to receive the viewing content **210**, while the vehicle **400** remains within the associated coverage region **220**.

The antenna control data **290** likewise can include steering data for controlling the physical positioning of the universal antenna system **500**. The antenna interface system **600** thereby can continuously direct the universal antenna system **500** toward the satellite communication system **250** as the vehicle **400** passes through the associated coverage region **220**. Further, the configuration of the universal antenna system **500** can be updated, as desired, during travel. The antenna interface system **600**, for instance, can reconfigure the universal antenna system **500** for communicating with another satellite communication system **250** as the vehicle information system **300** subsequently approaches and/or enters the coverage region **220** of the other another satellite communication system **250**. The universal antenna system **500** thereby can continuously receive the viewing content **210** during travel and provide the received viewing content **210** to the antenna interface system **600**. As desired, antenna power **298** (shown in FIGS. **10**A-B) can be provided to the universal antenna system **500** through the antenna interface system **600**.

Upon receiving the received viewing content **210**, the antenna interface system **600** can provide the received viewing content **210** to the universal receiver system **700**. As desired, the antenna interface system **600** can preprocess the received viewing content **210** in any conventional manner and provide the preprocessed viewing content **210** to the universal receiver system **700**. Illustrative preprocessing operations can include amplification and/or down-conversion of the received viewing content **210** without limitation. The antenna interface system **600** thereby can convert the received viewing content **210** into the preprocessed viewing content **210** that is suitable for distribution throughout the vehicle information system **300** without significant signal degradation.

The universal receiver system **700** can receive the viewing content **210**, including the received viewing content and/or the preprocessed viewing content **210**, from the antenna interface system **600** and provide the viewing content **210** to the distribution system **330** for distribution throughout within the vehicle information system **300**. In the manner set forth above with reference to the antenna interface system **600**, the universal receiver system **700** preferably operates under the control of the server system **310**, exchanging receiver status and control data **216** with the information system controller **312** via the distribution system **330**. The information system controller **312** thereby can configure the universal receiver system **700** to process the viewing content **210**, as desired. For example, the universal receiver system **700** can select appropriate portions of the viewing content **210** for distribution throughout the vehicle information system **300** and presentation via the passenger interfaces **320** (shown in FIGS. **2**A-B). The vehicle information system **300** thereby can advantageously receive and selectably present the viewing content **210** continuously during travel through one or more coverage regions **220** with limited interruption in service.

In the manner discussed in more detail above with reference to FIG. **5**, the vehicle information systems **300** of FIGS. **6**A-C are shown being configured to receive and selectably present the viewing content **210**, including the television programming content **210'**, via the satellite communication system **250**. As the vehicle **400** (shown in FIGS. **2**A-B) and, therefore, the vehicle information system **300** approach and/or enter coverage region **220** (shown in FIG. **1**) of the satellite communication system **250**, the antenna interface system **600** configures the universal antenna system **500** for receiving the television programming content **210'**. For example, the antenna interface system **600** can receive the antenna control data **290** for directing the universal antenna system **500** toward the satellite communication system **250** as set forth above. The universal antenna system **500** thereby can communicate with the satellite communication system **250** upon entering, and during passage through, the coverage region **220** of the satellite communication system **250**.

Turning to FIG. **6**A, the antenna interface system **600** includes an antenna control system **610** for initiating and/or maintaining communication between the universal antenna system **500** and the satellite communication system **250**. The antenna control system **610** can comprise any conventional type of antennal controller and can direct the universal antenna system **500** toward the satellite communication system **250** in any suitable manner. Operating under the control of the server system **310** (shown in FIGS. **2**A-B), the antenna control system **610** shown in FIG. **6**A can exchange antenna status and control data **218**A with the information system controller **312** (shown in FIG. **7**) via the distribution system **330**.

The antenna status and control data **218**A can include, for example, positional instruction for directing the universal antenna system **500** and/or reception instruction for establishing one or more reception characteristics, such as a frequency range and/or a signal polarity, of signals to be received by the universal antenna system **500**. Upon receiving the antenna status and control data **218**A, the antenna interface system **600** can configure the universal antenna system **500** in accordance with the instruction provided by the information system controller **312**. The information system controller **312** thereby can configure and control the universal antenna system **500** via the antenna status and control data **218**A.

As illustrated in FIG. **6**A, the antenna status and control data **218**A can include satellite position data **294** for directing the universal antenna system **500**. The antenna control system **610** likewise is shown as receiving vehicle position data **292**. The vehicle position data **292** is associated with a geographical position of the vehicle **400** (shown in FIGS. **2**A-B) and, therefore, the vehicle information system **300**; whereas, the satellite position data **294** includes positional information regarding the satellite communication system **250**. Upon receiving vehicle position data **292** and the satellite position data **294**, the antenna control system **610** can compare the vehicle position data **292** and the satellite position data **294** to provide antenna control data **290** for orienting the universal antenna system **500**. The antenna control system **610** can monitor the vehicle position data **292** in real-time and adjust the orientation of the universal antenna system **500**, as desired. Thereby, the antenna control system **610** can provide an open-loop system for orienting the universal antenna system **500** and maintaining communication between the universal antenna system **500** and the satellite communication system **250** during travel.

The universal antenna system **500** thereby continually is directed toward the satellite communication system **250** regardless of the position and/or orientation of the vehicle **400**. Advantageously, the antenna control system **610** can maintain communication between the universal antenna system **500** and the satellite communication system **250** without requiring feedback, such as a signal strength determination, from the universal receiver system **700**. To further ensure the pointing accuracy of the universal antenna system **500**, the antenna control system **610** can employ predictive algorithms, such as advanced second-order pointing algorithms, for directing the universal antenna system **500** toward the satellite communication system **250** as the vehicle **400** enters, and passes through, the associated coverage region **220** (shown in FIG. **1**). Such predictive algorithms can prove to be beneficial for maintaining the pointing accuracy of the universal antenna system **500**, particularly when the vehicle **400** experiences high rates of turn.

Since most travel involves travel in substantially straight lines, a typical predictive algorithm can predict a future position of the vehicle **400** (shown in FIGS. **2**A-B) via calculations based upon prior vehicle position data **292** of the vehicle **400**. During high rates of turn, however, the predictive algorithm preferably examines rate of change data (not shown) regarding the position of the vehicle **400** to predict a future position of the vehicle **400**. The antenna control system **610** thereby can direct the universal antenna system **500** toward the satellite communication system **250** based upon the rate of position change data while the vehicle **400** continues to experience the high rate of turn. After the turn, the predictive algorithm can return to predicting the future position of the vehicle **400** via the calculations based upon the prior vehicle position data **292**, and the antenna control system **610** make any correction to the orientation of the universal antenna system **500**. The antenna control system **610** thereby can maintain the pointing accuracy of the universal antenna system **500** during travel even if the vehicle **400** experiences high rates of turn.

The vehicle position data **292** and the satellite position data **294** can be provided in any conventional manner. As illustrated in FIG. **6**A, vehicle position data **292** can be provided by a vehicle position system **620**, such as a Global Positioning Satellite (GPS) system and/or an Inertial Reference System (IRS). Similarly, the satellite position data **294** can include ephemeras data for the satellite communication system **250** as stored by the server system **310** (shown in FIGS. **2**A-B) and provided to the antenna control system **610** via the distribution system **330**. The server system **310** preferably includes a database system **316** (shown in FIG. **7**) for storing and maintaining the satellite position data **294** for a plurality of preselected satellite communication systems **250**. The server system **310** can store ephemeras data for any predetermined number of satellite communication systems **250**, as desired.

The preselected satellite communication systems **250**, for example, include at least one satellite communication system **250** having an associated coverage region **220** (shown in FIG. **1**) through which the vehicle **400** expected to enter, and/or traverse, during travel. The database system **316** preferably comprises a complete database of information for each satellite communication system **250** within the expected region of travel for the vehicle **400**. Illustrative database information can include the satellite position data **294**, an associated coverage region **220**, transponder frequency data, signal polarization data, symbol rate data, video and/or audio program identification (PID) data, electronic program guide (EPG) data, forward error correction (FEC) data, and/or Program Clock Reference PID (PCR-PID) data during satellite handoff operations, without limitation. For each satellite communication system **250**, the database system **316** can store at least one contour boundary **222** (shown in FIG. **4**) that is based upon a preselected signal strength (or signal power level). For instance, the contour boundary **222** can approximate a coverage region having a contour boundary **222** with an Effective Isotropic Radiated Power (EIRP) of approximately −48 dBW for each relevant satellite communication system **250**.

To help ensure that the universal antenna system **500** is directed toward, and configured to communicate with, the relevant satellite communication system **250**, the antenna control system **610** continuously monitors the vehicle position data **292** in real time and, as needed, provides control data **290** for adjusting the orientation of the universal antenna system **500** as needed. As shown in FIG. **6**B, the satellite position data **294** likewise can be provided by the universal antenna system **500**. If the satellite communication system **250** includes a geostationary satellite, for example, the satellite position data **294** can comprise a fixed geographical location of the satellite communication system **250**. As desired, the antenna control system **610** likewise can provide the information system controller **312** (shown in FIG. **7**) with antenna status data, the satellite position data **294**, and/or the vehicle position data **292** via the antenna status and control data **218**A.

Upon receiving the antenna status data and control data **218**A from the antenna control system **610**, the information system controller **312** can compare the vehicle position data **292** with the appropriate contour boundary **222** for the relevant satellite communication system **250**. The information system controller **312** thereby can provide suitable antenna control data for directing the universal antenna system **500**. If the vehicle position data **292** remains within the appropriate contour boundary **222** for the current satellite communication system **250**, the information system controller **312** can provide antenna control data for directing the universal antenna system **500** toward the current satellite communication system **250**.

Similarly, the information system controller **312** can provide antenna control data for directing the universal antenna system **500** toward a different satellite communication system **250** when the vehicle position data **292** approaches the contour boundary **222** of the current satellite communication system **250**. The different satellite communication system **250** preferably has a coverage region **220** through which the vehicle **400** expected to enter upon leaving the coverage region **220** of the current satellite communication system **250**. If the vehicle **400** is not within the range of another satellite communication system **250**, the information system controller **312** preferably provides antenna control data for continuing to direct the universal antenna system **500** toward the current satellite communication system **250** until the vehicle **400** enters the range of another satellite communication system **250**.

As desired, the information system controller **312** likewise can monitor signal strength data associated with the received viewing content **210**. The signal strength data can be provided by the universal receiver system **700** and communicated to the information system controller **312** via the receiver status and control data **216**. The information system controller **312** thereby can be configured to continuously monitor the signal strength data of the received viewing content **210**, preferably in conjunction with the vehicle position data **292**. Thereby, if the signal strength data indicates that the signal strength of the received viewing content **210** is below a predetermined signal strength level as the vehicle position data **292** approaches the contour boundary **222** of the current satellite communication system, the information system controller **312** can determine that the vehicle **400** is traveling beyond the range of the current satellite communication system **250**. The information system controller **312** therefore can provide antenna control data for directing the universal antenna system **500** toward a different satellite communication system **250** or, if the vehicle **400** is not within the range of another satellite communication system **250**, the current satellite communication system **250** in the manner set forth above.

Illustrative antenna control data can include antenna azimuth data, antenna elevation data, and/or antenna polarization data for directing the universal antenna system **500** toward the appropriate satellite communication system **250**. The information system controller **312** can provide the antenna control data to the satellite communication system **250** via the antenna status and control data **218**A. The antenna control system **610** can receive the antenna control data and can orient the universal antenna system **500** in accordance with the antenna control data. The universal antenna system **500** thereby can be continuously directed toward, and configured to communicate with, the relevant satellite communication system **250**.

As desired, the antenna control system **610** can employ feedback for orienting the universal antenna system **500** toward the satellite communication system **250**. The antenna control system **610** can comprise a conventional feedback control system and is illustrated in FIG. **6**C as receiving an antenna status signal **296**, derived from signals, such as the composite signals **260** (shown in FIG. **8**A), as received from the satellite communication system **250**. For example, the antenna status signal **296** can represent a signal strength of the composite signals **260** as received by the universal antenna system **500**. Illustrative antenna control systems that employ feedback signals to direct antenna systems are disclosed in U.S. Pat. No. 5,790,175, entitled "AIRCRAFT SATELLITE TELEVISION SYSTEM FOR DISTRIBUTING TELEVISION PROGRAMMING DERIVED FROM DIRECT BROADCAST SATELLITES," issued to Sklar et al.; and U.S. Pat. No. 6,208,307, entitled "AIRCRAFT IN-FLIGHT ENTERTAINMENT SYSTEM HAVING WIDEBAND ANTENNA STEERING AND ASSOCIATED METHODS," issued to Frisco et al. The antenna control system **610** thereby can initialize and/or maintain the communication between the universal antenna system **500** and the satellite communication system **250**.

Returning to FIG. **6**A, the antenna interface system **600** likewise is illustrated as including a down-conversion system **630** for converting the viewing content **210** into converted viewing content **212** that is suitable for use with the vehicle information system **300**. For example, the satellite communication system **250** transmits the viewing content **210** within a predetermined first frequency band defined for conventional satellite communications. Upon receiving the viewing content **210** within the first frequency band, the down-conversion system **630** can convert the viewing content **210** into the converted viewing content **212** having a second frequency band that is compatible with the vehicle information system **300**. Stated somewhat differently, the down-conversion system **630** can convert the viewing content **210** having a first band (or "block") of frequencies into the converted viewing content **212** having a second band (or "block") of frequencies, which typically comprises lower frequencies that the frequencies associated with the first frequency band. The converted viewing content **212** thereby can be distributed throughout the vehicle information system **300** without significant signal degradation. Preferably being disposed adjacent to the universal antenna system **500**, the down-conversion system **630** provides the converted viewing content **212** to the universal receiver system **700**, which may be disposed distally from the universal antenna system **500**.

The universal receiver system **700** receives the converted viewing content **212** and includes one or more output ports (or viewing channels) **714** for providing preselected portions of the converted viewing content **212** as outputted viewing content **214**. Including audio and/or video content from the viewing content **210**, the outputted viewing content **214** can be provided in any conventional content format, including any analog and/or digital format, and preferably is multicast to the distribution system **330** as streamed viewing content by the output ports **714** substantially in real-time. Operating under the control of the server system **310** (shown in FIGS. **2**A-B), the universal receiver system **700** can exchange receiver status and control data **216** with the information system controller **312** (shown in FIG. **7**) via the distribution system **330**. The server system **310** thereby can configure the universal receiver system **700** to select the appropriate portions of the converted viewing content **212** to be provided as the outputted viewing content **214** for each output port **714** of the universal receiver system **700**. FIG. **6**A shows the output ports **714** of the universal receiver system **700** as being in communication with the distribution system **330** such that the outputted viewing content **214** can be distributed throughout the vehicle information system **300**. Therefore, in the manner discussed in more detail above, the passenger interfaces **320** (shown in FIGS. **2**A-B) can select the outputted viewing content **214** for presentation and can present the selected viewing content **214**, as desired.

In the manner discussed above with reference to FIG. **3**, for example, the viewing content **210** can include the television programming content **210'**. When the vehicle information system **300** is within the coverage region **220** of the satellite communication system **250**, the antenna control system **610** orient the universal antenna system **500** toward the satellite communication system **250** such that communication between the universal antenna system **500** and the satellite communication system **250** is maintained. The universal antenna system **500** thereby can receive the viewing content **210**, including the television programming content **210'**, and provide the television programming content **210'** to the down-conversion system **630**. Upon receiving the television programming content **210'**, the down-conversion system **630** can convert the television programming content **210'** into converted television content **212'**, within a predetermined frequency band, that is suitable for distribution throughout the vehicle information system **300** without significant signal degradation. The down-conversion system **630** can provide the converted television content **212'**, along with the converted viewing content **212**, to the universal receiver system **700**. Stated somewhat differently, the converted viewing content **212** includes the converted television content **212'**.

The universal receiver system **700** receives the converted viewing content **212** and can select the appropriate portions of the converted viewing content **212** to be provided as the outputted viewing content **214** for each output port **714** in the manner set forth above. For example, the information system controller **312** can provide receiver status and control data **216** for configuring the universal receiver system **700** to provide the converted television content **212'** as outputted television content **214'** on a selected output port **714**, such as output port **714**N, as illustrated in FIG. **6**A. In accordance with the receiver status and control data **216**, the universal receiver system **700**, upon receiving the converted viewing content **212**, selects the converted television content **212'** from the converted viewing content **212**, and provides the converted television content **212'** as outputted television content **214'** to the selected output port **714**N. The output port **714**N provides the outputted television content **214'** to the distribution system **330** for distribution throughout the vehicle information system **300** in the manner set forth above. The outputted television content **214'** thereby can be selected for presentation and presented via the passenger interfaces **320**.

A detail drawing of one illustrative embodiment of the universal entertainment system **100** is shown in FIG. **7** and will be discussed in conjunction with FIGS. **8**A-B, **9**A-C, **10**A-B, and **11**A-B. Turning to FIG. **7**, the universal entertainment system **100** is configured for installation onboard an aircraft **420** (shown in FIG. **2**B) and includes a universal antenna system **500**, provided in the manner discussed above with reference to FIGS. **3** and **4**A-B, for receiving viewing content **210**, such as television programming content **210'**. As shown in FIG. **7**, the universal antenna system **500** is shown as being disposed under, and protected by, a radome **510**. Preferably being adapted for installation on an exterior surface **440** (shown in FIG. **2**B) of the fuselage **430** (shown in FIG. **2**B) of the aircraft **420**, the radome **510** is configured to provide aerodynamic protection for the antenna system **500** without impeding receipt of the viewing content **210**. Thereby, the radio-frequency (RF) performance of the universal antenna system **500** can be optimized.

Likewise being adapted for installation on the fuselage **430** of the aircraft **420**, the universal antenna system **500** can include at least one antenna element **520** for receiving the viewing content **210**. Each antenna element **520** can be provided as a conventional antenna element and preferably comprises a high-gain, regional antenna element for receiving signals comprising the viewing content **210** provided by the satellite communication system **250**. Exemplary antenna elements **520** can comprise at least one dish antenna, a frequency selective surfaces (FSS) antenna, and/or a phased array antenna, without limitation. If the vehicle information system **300** the vehicle information system **300** is installed on an aircraft **420** (shown in FIG. 2B), for example, the universal antenna system **500** can comprise a conventional airborne antenna system, such as the Airborne Antenna System Model No. FSS 2760 as manufactured by Datron Advanced Technologies Inc., of Simi Valley, Calif. as shown in FIG. **8**B. The universal antenna system **500** of FIG. **8**B is illustrated as having a plurality of hemispherical lenses **525** and a feedstick assembly **570**. The feedstick assembly **570** travels over the exterior surface of the hemispherical lenses **525** and includes a plurality of sensors (not shown) for collecting the satellite signals focused by the hemispherical lenses **525**.

The viewing content **210** can be provided as a plurality of composite signals **260** as shown in FIG. **8**A. The composite signals **260** are illustrated as being a pair of oppositely-polarized signals **260**A, **260**B, which can be simultaneously received by the antenna element **520**. When the viewing content **210** comprises television programming content **210'**, for example, the viewing content **210** can be provided as a pair of oppositely-polarized direct broadcast satellite (DBS) signals within the Ku-Band (10.7 GHz-12.75 GHz). The oppositely-polarized signals **260**A, **260**B can be polarized in any conventional manner, including continuously steered linear (horizontal and vertical) polarization and/or circular (left-hand circular and right-hand circular) polarization. Preferably, the antenna element **520** can be controlled to selectably receive oppositely-polarized signals **260**A, **260**B with a predetermined polarity. The antenna element **520** likewise can be controllable to selectably receive oppositely-polarized signals **260**A, **260**B within a predetermined frequency band.

The polarity and frequency band of the oppositely-polarized signals **260**A, **260**B to be received by the antenna element **520** can be selected in any conventional manner, such as being software selectable and/or included with the antenna control data **290** provided by the antenna control system **610** of the antenna interface system **600**. The antenna control system **610** can provide the antenna control data **290** in the manner set forth in more detail above with reference to FIGS. **6**A-C. For example, the antenna control system **610** can provide the information system controller **312** (shown in FIG. **7**) with the vehicle position data **292** via the antenna status and control data **218**A, and the information system controller **312** can compare the vehicle position data **292** with the appropriate contour boundary **222** (shown in FIG. **4**) for the relevant satellite communication system **250**. The information system controller **312** thereby can provide suitable antenna status and control data **218**A for configuring the universal antenna system **550** for receiving the oppositely-polarized signals **260**A, **260**B.

If the pair of oppositely-polarized are within the Ku-Band (10.7 GHz-12.75 GHz), for example, the antenna element **520** can be configured to receive oppositely-polarized signals **260**A, **260**B within a selected frequency sub-band within the Ku-Band. The Ku-Band can be divided into any suitable number of frequency sub-band, each frequency sub-band have a predetermined frequency sub-band range. Illustrative frequency sub-bands within the Ku-Band can include a first frequency sub-band, such as between approximately 10.7 GHz and 11.7 GHz, and a second frequency sub-band, such as between approximately 11.7 GHz and 12.75 GHz. By configuring the antenna element **520** to be controllable to receive signals within a selected frequency band, the antenna element **520** advantageously can operate with increased efficiency and can be provided as a small, low-profile antenna element even in regions where the signals have low power levels.

Upon receiving can receive the viewing content **210**, the antenna element **520** can focus the received viewing content **210** via a conventional feed assembly (not shown). The universal antenna system **500** of FIG. **8**A likewise includes a preamplification system **530** for amplifying the received viewing content **210**. If the viewing content **210** is provided as a pair of oppositely-polarized signals **260**A, **260**B as discussed above, the preamplification system **530** can include a pair of low-noise amplifiers (LNAs) **530**A, **530**B for amplifying the pair of oppositely-polarized signals **260**A, **260**B as illustrated in FIG. **8**A. The received viewing content **210** thereby is boosted for transmission, preferably via a low-loss cable system (not shown). The preamplification system **530** provides the pair of amplified signals **262**A, **262**B to a vector modulator assembly **540**. Operating under the control of the antenna control system **610** of the antenna interface system **600**, the vector modulator assembly **540** provides amplitude and/or phase modulation for the pair of amplified signals **262**A, **262**B. The pair of modulated, amplified signals **264**A, **264**B then is provided to the down-conversion system **630** via a rotary joint **550** for conversion into viewing content **212** that is suitable for use with the vehicle information system **300** in the manner discussed above with reference to FIG. **6**A.

The vector modulator assembly **540** can be provided in any conventional manner and is reconfigurable to receive and, as desired, process the composite signals **260** having a selected polarity. In the manner set forth in more detail above with reference to FIGS. **6**A-C, for example, the information system controller **312** can compare the vehicle position data **292** of the vehicle **400** with the appropriate contour boundary **222** for the relevant satellite communication system **250** and thereby can provide suitable antenna status and control data **218**A for configuring the vector modulator assembly **540** to receive and process the composite signals **260**. As illustrated in FIG. **8**C, vector modulator assembly **540** can include a switching system **542**, a polarization system **544**, and/or a multiplexer system **546**. The switching system **542** can receive the pair of amplified signals **262**A, **262**B from the preamplification system **530** and process the amplified signals **262**A, **262**B in accordance with the control data **290** provided by the antenna control system **610**. If the pair of amplified signals **262**A, **262**B comprise linear polarized signals, such as a horizontally polarized signal **262**H and a vertically polarized signal **262**V, the switching system **542** can provide the linear polarized signals to the polarization system **544**.

The polarization system **544** can be provided in any conventional manner, including as an electronic polarization system and/or a mechanical polarization system, and is configured to maintain the polarization angle between the linear polarized signals **262**H, **262**V. Operating under the control of the antenna control system **610**, the polarization system **544** can phase shift one of the linear polarized signals **262**H, **262**V relative to the other linear polarized signal **262**H, **262**V. The polarization system **544** thereby can help ensure that the linear polarized signals **262**H, **262**V remain orthogonal to each other. Upon phase shifting the linear polarized signals **262**H, **262**V, the polarization system **544** can provide the phase-shifted linear polarized signals **262**H, **262**V as orthogonal linear polarized signals **262**H', **262**V' to the multiplexer system **546** as shown in FIG. **8**C.

The pair of amplified signals **262**A, **262**B likewise can be provided as circular polarized signals. As illustrated in FIG. **8**C, the pair of amplified signals **262**A, **262**B include a left-hand circular polarized signal **262**L and a right-hand circular polarized signal **262**R, the switching system **542** can provide the circular polarized signals **262**L, **262**R to the polarization system **544**. In accordance with the control data **290**, the switching system **542** can provide the circular polarized signals **262**L, **262**R directly to the multiplexer system **546**. The multiplexer system **546** is shown as operating under the control of the antenna control system **610** and thereby can select the pair of orthogonal linear polarized signals **262**H', **262**V' or the pair of circular polarized signals **262**L, **262**R to provide to the down-conversion system **630** as the pair of modulated, amplified signals **264**A, **264**B.

The universal antenna system **500** likewise can include an antenna steering system **560** for directing (or orienting) the antenna elements **520** toward the satellite communication system **250** regardless of the position and/or orientation of the aircraft **420**. Thereby, the universal antenna system **500** can maintain communication with the satellite communication system **250** in the manner set forth in more detail above with reference to FIG. **5**. The universal antenna system **500** can include, for example, mechanically-steered antenna elements and/or electronically-steered antenna elements such that the antenna steering system **560** can be provided in any conventional manner. As desired, the antenna steering system **560** can be configured to independently direct each antenna element **520** and/or to jointly direct at least one group of two or more of the antenna elements **520**. By independently directing one or more antenna elements **520**, the universal antenna system **500** can be configured to simultaneously communicate with one or more satellite communication system **250**.

The antenna steering system **560** is illustrated in FIGS. **8**B and **10**A as including one or more motor systems. For example, the antenna steering system **560** can include an azimuth motor system **560**A for driving the azimuth of the universal antenna system **500** and/or an elevation motor system **560**E for driving the elevation of the universal antenna system **500**. The antenna steering system **560** can include additional motor systems, as desired, including a polarization motor system (not shown) for driving the polarization of the universal antenna system **500**. If provided as stepper motor systems, for example, the azimuth motor system **560**A can be provided as a National Electrical Manufacturers Association (NEMA) Size 23 high-torque stepper motor; whereas, an exemplary elevation motor system **560**E can include a NEMA Size 17 high-torque stepper motor.

As shown in FIGS. **8**A and **10**A, the antenna steering system **560** can be controlled via the antenna control system **610** of the antenna interface system **600**. In the manner discussed above with reference to the antenna control data **290**, the antenna control system **610** receives vehicle position data **292** from a vehicle position system **620** and satellite position data **294** from the universal antenna system **500**. The antenna control system **610** can compare the vehicle position data **292** and the satellite position data **294** to provide the antenna control data **290**, which is provided to the antenna steering system **560**. As desired, the antenna control data **290** can include one or more control data components for controlling the various motor systems of the antenna steering system **560**. The antenna control data **290** as illustrated in FIG. **10**A, for example, includes azimuth antenna control data **290**A for controlling the azimuth motor system **560**A and elevation antenna control data **290**E for controlling the elevation motor system **560**E. The antenna control system **610** thereby can control the azimuth and elevation of the universal antenna system **500** such that the universal antenna system **500** is directed toward, and maintains communication with, the satellite communication system **250** in the manner set forth in more detail above.

It will be appreciated that the antenna steering system **560** may require initial and/or periodic calibration for further assuring that communication between the universal antenna system **500** and the satellite communication system **250** is maintained. Although the antenna steering system **560** can be calibrated in any conventional manner, including via manual calibration, the antenna steering system **560** preferably is automatically calibrated. For example, when the vehicle information system **300** is initialized, the absolute geographical position of the aircraft **420** and, therefore, the vehicle information system **300**, can be determined by cycling each axis until a fixed position detection switch (not shown) is activated. The antenna control system **610** thereby can establish a "zero-reference" position for the aircraft **420** and maintain the current geographic position of the aircraft **420** by making discrete positional steps relative to the "zero-reference" position.

The antenna steering system **560** likewise can be calibrated by sampling the viewing content **210** received via the satellite communication system **250** at a plurality of different vehicle orientations as illustrated in FIGS. **9**A-C. One or more selected signal characteristics, such as a signal strength, of the viewing content **210** can be determined for each vehicle orientation. The viewing content **210** can be sampled and the selected signal characteristics can be determined for any suitable number of vehicle orientations. Preferably, the signal strength of the viewing content **210** is sampled from at least three vehicle orientations, each which are separated by an angular displacement at least ninety degrees. For example, the antenna control system **610** can sample the signal strength of the viewing content **210** with the aircraft **420** pointing west, north, and south prior to travel.

FIG. **9**A shows the vehicle information system **300** sampling the viewing content **210** received via a selected satellite communication system **250** while the aircraft **420** is oriented in a first direction D**1**. The aircraft **420** subsequently is oriented in a second direction D**2**, which comprises an angular displacement of the aircraft **420** by a first predetermined angle θ_{12} from the first direction D**1** as illustrated in FIG. **9**B. The vehicle information system **300** again samples the viewing content **210** received via the selected satellite communication system **250** with the aircraft **420** oriented in the second direction D**2**. Thereafter, the aircraft **420** can be oriented in a third direction D**3**, which comprises an angular displacement of the aircraft **420** by a second predetermined angle θ_{23} from the second direction D**2** as shown in FIG. **9**C, and the vehicle information system **300** can again sample the viewing content **210**. It will be appreciated that the predetermined angles θ_{12}, θ_{23} between the successive directions D**1**, D**2**, D**3** can be uniform and/or different.

The viewing content **210** can be sampled for additional vehicle orientations, as desired. For each of the directions D**1**, D**2**, D**3** of the aircraft **420**, the selected signal characteristics of the viewing content **210** are determined from the sampled viewing content **210**. The antenna control system **610** thereby can provide one or more software offset values representing the offset of the position of the satellite communication system **250** relative to the current geographical position of the aircraft **420** and, therefore, the vehicle information system **300** via closed-loop tracking. During subsequent travel, the antenna control system **610** can maintain communication between the universal antenna system **500** and the satellite communication system **250** by tracking the geographical position of the aircraft **420** and applying the software offset values.

In the manner discussed above with reference to FIGS. **5** and **6**A-C, the antenna control system **610** can configure the universal antenna system **500** for receiving the viewing content **210** from the satellite communication system **250**. Turning to FIGS. **10**A-B, the antenna control system **610** is shown as providing antenna control data **290** and antenna power **298** to the universal antenna system **500**. The antenna control system **610** can communicate with the information system controller **312** (shown in FIG. **7**) to exchange the interface status and control data **218** in any conventional manner, including via the wired and/or wireless distribution system **330**. Preferably, the antenna control system **610** and the information system controller **312** are coupled via at least one serial communication connection, such as a serial communication link in accordance with Electronic Industries Alliance (EIA) Standard RS-232 and/or Electronic Industries Alliance (EIA) Standard RS-485, and/or an Ethernet communication connection, including Fast Ethernet (such as 100Base-SX and/or 100Base-T) and/or Gigabit (such as 1000Base-SX and/or 1000Base-T) Ethernet. The antenna control system **610** thereby can receive the antenna status and control data **218**A, including the satellite position data **294**, from the information system controller **312**.

The antenna control system **610** likewise can communicate with the vehicle position system **620** in any suitable manner to receive the vehicle position data **292** in the manner set forth in more detail above. The antenna control system **610** and the vehicle position system **620** preferably communicate via an ARINC **429** bus as shown in FIG. **10**A. To configure the universal antenna system **500**, the antenna control system **610** can provide the antenna control data **290** to the universal antenna system **500** in any conventional manner. The antenna control system **610** preferably provides the antenna control data **290** to the universal antenna system **500** via at least one serial communication connection, such as a serial communication link in accordance with Electronic Industries Alliance (EIA) Standard RS-232 and/or Electronic Industries Alliance (EIA) Standard RS-485.

For example, the antenna control system **610** can provide positioning control to the universal antenna system **500**. When in a listening mode, the antenna control system **610** can convert the vehicle position data **292**, such as a geographical location and/or an attitude, for the vehicle **400** (shown in FIGS. **2**A-B) into azimuth antenna control data **290**A and/or elevation antenna control data **290**E based upon the satellite position data **294**. In the manner discussed above, the antenna control system **610** can receive the satellite position data **294** from the information system controller **312** and/or the universal antenna system **500**. As desired, the antenna control system **610** can receive input power **6181** and provide the antenna power **298** to the universal antenna system **500**. The antenna control system **610** likewise can distribute power to other functional components, such as the down-conversion system **630**, of the vehicle information system **300**.

One preferred embodiment of the antenna control system **610** is illustrated in FIG. **10**B. The antenna control system **610** is shown as including an axis control PCBA **612** for receiving the status and control data **218**, including the antenna status and control data **218**A and/or the satellite position data **294**, from the information system controller **312** (shown in FIG. **7**). Operating under the control of a processing system **614**, the axis control PCBA **612** likewise can the control data **290**, including the azimuth antenna control data **290**A and/or elevation antenna control data **290**E, to the universal antenna system **500**. As desired, the status and control data **218** can include down-converter status and control data **218**D, which the axis control PCBA **612** can provide to the down-conversion system **630**. The processing system **614** can be provided in any conventional manner and preferably comprises a single-board computer (SBC) as shown in FIG. **10**B. The antenna control system **610** further can include one or more interface cards for facilitation communication between the antenna control system **610** and other functional components. As illustrated in FIG. **10**B, for example, the antenna control system **610** can be provided with an ARINC interface card **616** for coupling the vehicle position system **620** and the processing system **614**.

Upon being directed toward, and/or configured to communication with, the satellite communication system **250**, the universal antenna system **500** can receive the viewing content **210**. In the manner discussed above with reference to the universal antenna system **500** (shown in FIG. **8**A), the universal antenna system **500** can provide the viewing content **210** as a pair of modulated, amplified signals **264**A, **264**B to the down-conversion system **630**. The down-conversion system **630** thereby can convert the pair of modulated, amplified signals **264**A, **264**B into a pair of converted signals **266**A, **266**B suitable distribution throughout the vehicle information system **300**. Stated somewhat differently, the down-conversion system **630** can convert (or frequency shift) the pair of high-frequency signals **264**A, **264**B within the Ku-Band (10.7 GHz-12.75 GHz) into a pair of intermediate-frequency (or low-frequency) signals **266**A, **266**B within a predetermined intermediate-frequency (or low-frequency) band, such as the L-Band (950 MHz-2150 MHz). When converted into the intermediate-frequency signals **266**A, **266**B, the viewing content **210** can be distributed within the vehicle information system **300** without significant cable loss and/or signal degradation.

It will be appreciated that, due to the very high frequencies associated with the Ku-Band, distribution of the pair of signals **264**A, **264**B through long cabling (or fiber) systems (not shown) is not practical, even via low-impedance coaxial cables. The down-conversion system **630** therefore should be disposed within a close proximity to the universal antenna system **500**, such as within approximately ten feet. By converting the pair of high-frequency signals **264**A, **264**B into the pair of intermediate-frequency signals **266**A, **266**B, the intermediate-frequency signals **266**A, **266**B can be distributed over longer distances via the cabling systems than can the pair of high-frequency signals **264**A, **264**B. Thus, the down-conversion system **630** converts the pair of high-frequency signals **264**A, **264**B into the pair of intermediate-frequency signals **266**A, **266**B, which are suitable distribution within the vehicle information system **300**.

The down-conversion system **630** can be provided in any conventional manner, such as via one or more down-converters, as desired. Preferably, the down-conversion system **630** comprises a configurable down-conversion system and operates directly and/or indirectly under the control of the information system controller **312** (shown in FIG. **7**). An exemplary down-conversion system **630** the low noise block down-converter assembly manufactured as Model No. 43740-1 by Norsat International Inc., of Burnaby, British Columbia, Canada. In the manner discussed in more detail above with reference to the antenna control system **610**, the down-conversion system **630** can exchange interface status and control data **218**, such as the down-converter status and control data **218**D, with the information system controller **312**. The down-conversion system **630** can communicate with the information system controller **312** in any conventional manner. For example, the down-conversion system **630** and the information system controller **312** can communicate via the distribution system **330** as shown in FIG. **5** and/or via the antenna control system **610** as illustrated in FIG. **8**A. Therefore, the information system controller **312** and/or the antenna control system **610** can configure the down-conversion system **630**, as desired, to down-convert the pair of high-frequency signals **264**A, **264**B.

The down-conversion system **630**, for instance, can be configured to selectably down-convert (or frequency shift) the pair of high-frequency signals **264**A, **264**B. In the manner set forth in more detail above with reference to the universal antenna system **500** (shown in FIGS. **8**A-B), the universal antenna system **500** can be configured to operate in a selected frequency sub-band among a plurality of frequency sub-bands of a predetermined high-frequency band. For example, the Ku-Band (10.7 GHz-12.75 GHz) can be divided into a plurality of frequency sub-bands, such as the first frequency sub-band (10.7 GHz and 11.7 GHz) and/or the second frequency sub-band (11.7 GHz and 12.75 GHz), as discussed above with reference to FIG. **8**A. The down-conversion system **630** likewise can convert the pair of high-frequency signals **264**A, **264**B into the pair of intermediate-frequency signals **266**A, **266**B within a selected frequency sub-band among a plurality of frequency sub-bands of a predetermined intermediate-frequency band.

When the predetermined intermediate-frequency band comprises the L-Band (950 MHz-2150 MHz), the L-Band can be divided into a plurality of intermediate-frequency sub-bands. Illustrative intermediate-frequency sub-bands can include a first low frequency sub-band (950 MHz and 1950 MHz) and/or a second low-frequency sub-band (1100 MHz and 2150 MHz). Therefore, the down-conversion system **630** can convert the pair of high-frequency signals **264**A, **264**B in a predetermined high-frequency sub-band of the Ku-Band into the pair of intermediate-frequency signals **266**A, **266**B within a corresponding low-frequency sub-band of the L-Band. An exemplary relationship between the pair of high-frequency signals **264**A, **264**B and the pair of intermediate-frequency signals **266**A, **266**B that can be provided via the down-conversion system **630** is illustrated in Table 1 when the Ku-Band and the L-Band each are divided into two frequency sub-bands.

TABLE 1

Exemplary Down-Conversion from High-Frequency Signals to Low-Frequency Signals

	Low-Frequency Sub-Band	High-Frequency Sub-Band
Antenna Ku-Band Reception	10.7 GHz to 11.7 GHz	11.7 GHz to 12.75 GHz
Down-Conversion LO Frequency	9.75 GHz	10.6 GHz
L-Band Operation	950 MHz to 1950 MHz	1100 MHz to 2150 MHz

The selected frequency sub-band can be selected via the down-converter status and control data **218**D in the manner set forth above. The down-conversion system **630** thereby can be configured to convert the pair of high-frequency signals **264**A, **264**B within the selected high-frequency sub-band within the Ku-Band into the pair of intermediate-frequency signals **266**A, **266**B within an associated low-frequency sub-band within the L-Band. In the manner set forth in more detail above with reference to FIGS. **6**A-C, for example, the information system controller **312** can compare the vehicle position data **292** of the vehicle **400** with the appropriate contour boundary **222** for the relevant satellite communication system **250** and thereby can provide suitable antenna status and control data **218**A for configuring the down-conversion system **630** to convert the pair of high-frequency signals **264**A, **264**B in a suitable manner. The down-conversion system **630** likewise can receive power **6180** from the antenna control system **610** in the manner discussed above with reference to the antenna control system **610** (shown in FIGS. **10**A-B). In addition, or alternatively, the down-conversion system **630** can derive power from a direct current (DC) offset voltage, such as nineteen volts (19 VDC), that is supplied on the L-Band outputs. The universal receiver system **700** (shown in FIG. **7**) likewise can provide power the down-conversion system **630** by driving the offset voltage on its L-Band input nodes.

The down-conversion system **630** likewise can include an amplification system **632** for amplifying the pair of intermediate-frequency signals **266**A, **266**B as shown in FIG. **10**A. In the manner discussed in more detail above with reference to the preamplification system **530** of the universal antenna system **500** (shown in FIG. **8**A), the amplification system **632** can include a predetermined number of low-noise amplifiers (LNBs) **632**A, **632**N. Each low-noise amplifier **632**A, **632**N can be provided in any conventional manner and is configured to amplify one of the intermediate-frequency signals **266**A, **266**B. The pair of intermediate-frequency signals **266**A, **266**B thereby can be boosted for transmission to the universal receiver system **700**.

Returning again to FIG. **7**, the universal receiver system **700** is illustrated as receiving the pair of intermediate-frequency signals **266**A, **266**B provided by the down-conversion system **630**. Since the pair of intermediate-frequency signals **266**A, **266**B can be distributed over longer distances as discussed above, the universal receiver system **700** may be provided at any suitable location on the vehicle **400** (shown in FIGS. **2**A-B), as desired. The universal receiver system **700** therefore can be disposed adjacent to the antenna interface system **600** at a head-end of the vehicle **400** and/or distally from the antenna interface system **600** at a back-end (or tail-end) of the vehicle **400**. For example, the universal receiver system **700** can be disposed adjacent to the passenger seat groups **360** (shown in FIG. **12**), including within at least one handheld presentation system **326** (shown in FIG. **12**).

If disposed with the handheld presentation systems **326**, the handheld presentation systems **326** can be provided in the manner set forth in the above-referenced co-pending U.S. patent application, entitled "PORTABLE MEDIA DEVICE AND METHOD FOR PRESENTING VIEWING CONTENT DURING TRAVEL," Ser. No. 11/154,749, filed on Jun. 15, 2005. Each handheld presentation system **326** can be provided in any conventional manner, such as a laptop computer, a palmtop computer, and/or a personal digital assistant (PDA), and preferably comprises a wireless, hand-held television appliance. The handheld presentation systems **326** likewise can include at least one television receiver system (not shown). Thereby, the handheld presentation systems **326** can be configured to receive and, as desired, decode the pair of intermediate-frequency signals **266**A, **266**B provided by the universal antenna system **500** via the antenna interface system **600**.

The universal receiver system **700** is shown in FIGS. **7** and **11**A-B as including a plurality of direct broadcast satellite (DBS) television receiver (DTR) systems **710**. Each DBS television receiver system **710** can simultaneously receive and decode one or more DBS television channels, providing the decoded DBS television channels in any conventional audio and/or video format. For example, the DBS television receiver systems **710** each can provide the decoded DBS television channels in an analog format and/or a digital format. Illustrative analog audio and/or video formats can include a National Television System Committee (NTSC) standard format, a Phase Alternating Line (PAL) standard format, and/or a Sequential Couleur Avec Memoire (or Sequential Colour with Memory) (SECAM) standard format; whereas, a Moving Picture Experts Group (MPEG-1, MPEG-2, MPEG-4) transport stream is an exemplary digital audio and/or video format. The decoded DBS television channels preferably are suitable for distribution throughout the vehicle information system **300** via a distribution system **330** and presentation via the passenger interfaces **320** (shown in FIGS. **2**A-B).

In a preferred embodiment, the universal receiver system **700** includes three DBS television receiver systems **710**, each being configured to provide up to twelve or more DBS television channels. The architecture of the DBS television receiver systems **710** can be uniform and/or different among the DBS television receiver systems **710**, as desired. As illustrated in FIG. **7**, the universal receiver system **700** can provide the DBS television receiver systems **710** in a radio frequency (RF) chain. Comprising uniform DBS television receiver systems **710**, each DBS television receiver system **710** is shown as including an intermediate (IF) multiplexer (and/or splitter) system **720**, at least one DBS receiver module (DRM) **730**, at least one media encoder system **740**, and an Ethernet switch system **750**. In the manner discussed above with reference to FIGS. **6**A-C, each DBS television receiver system **710** of the universal receiver system **700** preferably operates under the control of the server system **310**, exchanging receiver status and control data **216** with the information system controller **312** via the distribution system **330**. For example, the information system controller **312** can compare the vehicle position data **292** of the vehicle **400** with the appropriate contour boundary **222** for the relevant satellite communication system **250** and thereby can provide suitable receiver status and control data **216** for configuring the universal receiver system **700** to receive and process the incoming pair of converted signals **266**A, **266**B, as desired.

Within each DBS television receiver system **710**, the intermediate multiplexer system **720** can receive the incoming pair of converted signals **266**A, **266**B and distribute the converted signals **266**A, **266**B among the associated DBS receiver modules **730**, as desired, as individual L-band signals **268**. Each DBS receiver module **730** receives the suitable individual L-band signal **268** and selects an appropriate polarization, such as a vertical/right-had polarization and/or a horizontal/left-hand polarization, of the received L-band signal **268**. The DBS receiver module **730** can select the appropriate polarization of the received L-band signal **268** in any conventional manner, including via the application of a signal, such as a direct current voltage, on a selection input port (not shown). Preferably, the direct current voltage can be applied to the L-band signal **268** provided to the DBS receiver module **730**. As desired, the intermediate multiplexer system **720** in the first DBS television receiver system **710'** in the radio frequency (RF) chain can provide power **618**O (shown in FIG. **10**A) to the down-conversion system **630** in the manner set forth above with reference to FIGS. **10**A-B.

If one or more of the DBS television receiver systems **710** in the universal receiver system **700** loses power or otherwise fails, the remaining DBS television receiver systems **710** preferably can continue to operate normally. The intermediate multiplexer systems **720** can be provided in a manner to facilitate the robustness of the universal receiver system **700**. For example, the intermediate multiplexer system **720** in a failing DBS television receiver system **710** preferably can be disabled (or powered down) by another DBS television receiver system **710**, which is downstream in the radio frequency (RF) chain from the failing DBS television receiver system **710**. The intermediate multiplexer system **720** in the failing DBS television receiver system **710** likewise can pass the incoming pair of converted signals **266**A, **266**B to the downstream DBS television receiver systems **710**. The downstream DBS television receiver systems **710** thereby can continue to function despite the failing DBS television receiver system **710**. Further, the intermediate multiplexer system **720** in the failing DBS television receiver system **710** preferably continues to supply power to any upstream DBS television receiver systems **710** and/or the down-conversion system **630**.

Preferably being provided as an equivalent to a television set-top converter box, each DBS receiver module **730** receives the L-band signal **268** from the intermediate multiplexer system **720**. Upon receiving the L-band signal **268**, the DBS receiver module **730** can decode the L-band signal **268** to provide a single channel **269** of direct broadcast satellite (DBS) programming. The DBS receiver module **730** likewise can provide an analog audio and/or video outputs, such as analog stereo audio outputs and/or an NTSC (or PAL or SECAM) analog video output, as desired. Each DBS receiver module **730** can be electrically and/or mechanically configured for use as any conventional type of DBS receiver system, including as a custom DBS receiver system and/or as a commercial off-the-shelf (or COTS) DBS receiver system. Preferably, each DBS receiver module **730** is configurable to receive "free-to-air" (or unencrypted) content and/or premium (or encrypted) content. Since each DBS television receiver system **710** can operate under the control of the server system **310**, reconfiguration of the DBS receiver module **730** preferably is automatic and requires no (or limited) manual intervention.

Each DBS television receiver system **710** preferably includes one media encoder system **740** for each DBS receiver module **730**. Each media encoder system **740** can be provided in any conventional manner and can be configured to convert the analog audio and/or video outputs of the associated DBS receiver module **730** into, for example, a multicast Ethernet MPEG-2 transport stream suitable for distribution throughout the vehicle information system **300** via the distribution system **330**. As desired, the encoder systems **740** can be configured to simultaneously process a plurality of video signals and/or a plurality of audio signals and preferably can simultaneously process twelve video signals and two audio signals. The encoder systems **740** thereby can provide the outputted television content **214'** to the distribution system **330** in the manner discussed in more detail above with reference to FIGS. **6**A-C. The outputted television content **214'** thereby can be selected and presented via the passenger interfaces **320** (shown in FIGS. **2**A-B).

Preferably, the DBS television receiver systems **710** are tuned to separate television channels **270** (shown in FIGS. **13**A-B) as provided by the satellite communication system **250** as the viewing content **210** and can simultaneously process the television channels **270**. The DBS television receiver systems **710** can process the television channels **270** in any conventional manner. For example, the DBS television receiver systems **710** can include quadrature phase shift keying (QPSK) demodulation systems **736** (shown in FIG. **11**B) for demodulating the television channels **270**. The DBS television receiver systems **710** likewise can provide forward error correction (FEC) to restore the integrity of the television channels **270**, as necessary, and can further convert the symbols of the television channels **270** to video and/or audio signals, as desired. The symbols of each television channel **270** preferably can be converted directly to video signals, such as video signals in a National Television System Committee (NTSC) standard format, a Phase Alternating Line (PAL) standard format, and/or a Sequential Couleur Avec Memoire (or Sequential Colour with Memory) (SECAM) standard format, and the associated stereo audio signals.

In the manner discussed above with reference to FIGS. **2**A-B, the distribution system **330** can include any conventional type of wired and/or wireless distribution system. Exemplary wireless distribution systems include wireless fidelity (Wi-Fi) networks in accordance with Institute of Electrical and Electronics Engineers (IEEE) Standard 802.11 and/or wireless metropolitan-area networks (MANs), which also are known as WiMax Wireless Broadband, in accordance with IEEE Standard 802.16. Preferably being configured to support high data transfer rates, the distribution system **330** preferably comprises a high-speed Ethernet network, such as any type of Fast Ethernet (such as 100Base-SX and/or 100Base-T) communication network and/or Gigabit (such as 1000Base-SX and/or 1000Base-T) Ethernet communication network. If provided as a wired distribution system, the distribution system **330** can include one or more copper connections and/or fiber optic connections, as desired.

Alternatively, and/or in addition, the universal receiver system **700** be provided in a modular manner to further facilitate reconfiguration of the vehicle information system **300** for international (or multi-regional) usage. The universal receiver system **700** thereby can be reconfigured by replacing one or more of the system modules, requiring minimal manual intervention. Turning to FIG. **11**A, for example, the universal receiver system **700** can be provided in the manner set forth above with reference to FIG. **7** and is shown as including at least one DBS television receiver system **710**, comprising a plurality of replaceable receiver system modules **720**, **730**, **740**, **760**, and **770**. As discussed above, the intermediate multiplexer module **720** can receive the incoming pair of converted signals **266**A, **266**B and distribute the converted signals **266**A, **266**B among the associated DBS receiver modules **730**; whereas, the DBS receiver modules **710** can decode one or more DBS television channels and provide the decoded DBS television channels. The media encoder module **740** can convert the analog audio and/or video outputs of the associated DBS receiver module **730** into the outputted television content **214'** for distribution throughout the vehicle information system **300**.

The DBS television receiver systems **710** of FIG. **11**A likewise is shown as including a MDR host controller (MHC) module **760** for providing a communication interface and controls for the receiver system modules **720**, **730**, and **740** and a power supply card **770** for providing suitable power to each receiver system module **720**, **730**, **740**, and **760**. The receiver system modules **720**, **730**, **740**, **760**, and **770** are removable coupled with, and can communicate via, a backplane system **780** in the conventional manner. The backplane system **780** as shown in FIG. **11**A can include the Ethernet switch system **750** and can communicate with the remainder of the vehicle information system **300** via an I/O system **790**. Operating under the control of the MDR host controller (MHC) module **760**, the Ethernet switch system **750** can provide intelligent routing and content control for the outputted television content **214'** via the distribution system **330** to each passenger interface **320** (shown in FIGS. **2**A-B). Thereby, one or more of the receiver system modules **720**, **730**, **740**, **760**, and **770** can be removed and/or replaced to reconfigure the universal receiver system **700** for regional use with minimal manual intervention.

FIG. **11**B illustrates a preferred embodiment of the universal receiver system **700**, wherein the DBS television receiver systems **710** can support both "free-to-air" (or unencrypted) content and/or premium (or encrypted) content. Each DBS television receiver system **710** preferably is configured to receive pair of converted signals **266**A, **266**B that includes digital video broadcasting (DVB) television programming content **210'** (shown in FIG. **7**) and can distribute at least one channel of the television programming content **210'** as the outputted television content **214'**, having a single, fixed-bit rate MPEG-2 transport stream via the distribution system **330**. Since the bit rate of the television programming content **210'** provided by the satellite communication system **250** (shown in FIG. **7**) may be fixed and/or variable.

The bit rate of the distribution stream can be fixed and may be higher or lower than the bit rate of the original satellite broadcast, as desired. Due to limitations on the distribution system **330**, the distribution bit rate typically is lower than the satellite broadcast bit rate. The low distribution bit rate in conventional vehicle information systems has prevented large numbers of television channels from being made available to passengers. In contrast, the vehicle information system **300** advantageously reduces hardware, and therefore system weight, and can distribute an increased number of television channels among the passenger interfaces **320** via the relatively low bandwidth distribution system **330**.

To distribute an increased number of television channels via the relatively low bandwidth distribution system **330**, the architecture of the DBS receiver modules **730** is illustrated in FIG. **11**B as including a radio frequency (RF) front end system, such as L-Band front end system **732**, and a digital video broadcasting (DVB) tuning system **738**. The L-Band front end systems **732** are configured to communicate with a processing system **742**, such as one or more digital signal processors (DSPs) **744** and associated memory and logic **746**, which, in turn, can communicate with the distribution system **330**. Each L-Band front end system **732** likewise can communicate with a radio frequency (RF) tuning system, such as an L-Band tuning system **734**, and a quadrature phase shift keying (QPSK) demodulation system **736**.

Each radio frequency (RF) front end system is configured to receive a quadrature phase shift keying (QPSK) modulated satellite transponder and to present the demodulated data, such as the single channel **269** of direct broadcast satellite (DBS) programming, as an MPEG-2 transport stream for transcoding by the processing system **742** of the media encoder system **740**. For each transponder, the processing system **742** can extract a single programming channel **269** from, for example, the incoming MPEG-2 transport stream and can transcode it to an MPEG-2 transport stream of the outputted television content **214'** at the distribution bit rate. The resulting MPEG-2 transport streams (one from each L-Band front end system **732**) can be multiplexed into a composite MPEG-2 transport stream of outputted television content **214'**. The composite MPEG-2 transport stream thereby can be distributed over the distribution system **330** to the passenger interfaces **320**.

The universal antenna system **500** and the universal receiver system **700** are illustrated in FIG. **12** as being coupled with an illustrative distribution system **330** for distributing the viewing content **210** throughout a conventional vehicle information system **300** installed in a vehicle **400**. Thereby, viewing content **210**, including the outputted television content **214'** provided by the universal antenna system

500 and the universal receiver system **700**, can be distributed to the passenger interfaces **320** for presentation. As shown in FIG. **12**, the outputted television content **214'** can be provided to the server system **310**. The server system **310** can distribute the outputted television content **214'** to a plurality of area distribution boxes (ADBs) **370** and, as desired, store the outputted television content **214'** via the media (or file) server system **314**. The area distribution boxes **370** are distributed throughout the vehicle **400** and are configured to communicate with a plurality of seat electronics boxes (SEBs) **380**. The passenger interfaces **320** can receive the outputted television content **214'** via an associated seat electronics box **380**. The outputted television content **214'** thereby can be selected and presented via the passenger interfaces **320** during travel, including international travel

Turning to FIGS. **13**A-B, each satellite communication system **250** can be configured to provide viewing content **210** associated with a plurality of television channels **270**. Conventional satellite communication systems **250** typically provide approximately one hundred and fifty television channels **270** of television programming content **210'**. The satellite communication system **250**A of FIG. **13**A, for example, is shown as providing up to M channels **270**A-M of television programming content **210'**; whereas, up to P channels **270**A-P of television programming content **210'** can be provided via the satellite communication system **250**B of FIG. **13**B. When the vehicle **400** (shown in FIGS. **2**A-B) is within the relevant coverage region **220**A, **220**B (collectively shown in FIG. **1**), the vehicle information system **300** can receive and selectively present the television programming content **210'** from the associated satellite communication system **250**A, **250**B. Any viewing content **210** that is common to the satellite communication systems **250**A, **250**B preferably is presented via the same viewing channels **714** of the vehicle information system **300**.

As shown in FIG. **13**A, for example, television programming content **210**X' is provided via television channel **270**A of the satellite communication system **250**A; whereas, television channels **270**B, **270**C of the satellite communication system **250**A respectively provide television programming content **210**Y', **210**Z'. If the vehicle **400** is within the coverage region **220**A of the satellite communication system **250**A, the vehicle information system **300** can receive the television programming content **210**X', **210**Y', and **210**Z' in the manner set forth in more detail above. Upon receiving the television programming content **210**X', **210**Y', and **210**Z', the universal antenna system **500** can provide the television programming content **210**X', **210**Y', and **210**Z' to the universal receiver system **700**. The universal receiver system **700** is illustrated as providing the television programming content **210**X', **210**Y', and **210**Z' via viewing channels **714**B, **714**N, AND **714**I, respectively.

The television programming content **210**X', **210**Y', and **210**Z' likewise is illustrated in FIG. **13**B as being available via the satellite communication system **250**B. Stated somewhat differently, the television programming content **210**X', **210**Y', and **210**Z' is common to the satellite communication systems **250**A, **250**B. As shown in FIG. **13**B, the television programming content **210**X' is provided via television channel **270**J of the satellite communication system **250**B; whereas, television channels **270**B, **270**P of the satellite communication system **250**B respectively provide television programming content **210**Y', **210**Z'. If the vehicle **400** is within the coverage region **220**B (shown in FIG. **1**) of the satellite communication system **250**B, the vehicle information system **300** can receive the television programming content **210**X', **210**Y', and **210**Z' in the manner discussed above. Upon receiving the television programming content **210**X', **210**Y', and **210**Z', the universal antenna system **500** can provide the television programming content **210**X', **210**Y', and **210**Z' to the universal receiver system **700**. The universal receiver system **700** is illustrated as again providing the television programming content **210**X', **210**Y', and **210**Z' via the viewing channels **714**B, **714**N, AND **714**I, respectively.

Preferably, the database system **316** (shown in FIG. **7**) includes a channel listing (or electronic program guide (EPG)) of the available television channels **270** for each preselected satellite communication system **250**. The MDR host controller (MHC) module **760** (shown in FIG. **11**A), for example, can receive the electronic program guide (EPG) data that is embedded in the viewing content **210** provided by the relevant satellite communication system **250** via the DBS television receiver systems **710**, which can decode electronic program guide (EPG) data. As the vehicle **400** approaches the coverage region **220**B, the information system controller **312** (shown in FIG. **7**) therefore can access the channel listing from the database system **316** and can provide appropriate receiver status and control data **216** to instruct the universal receiver system **700**. The information system controller **312** thereby can configure the universal receiver system **700** to select the common television programming content **210**X', **210**Y', and **210**Z' for distribution throughout the vehicle information system **300**. The universal receiver system **700** likewise can be configured to distribute the common television programming content **210**X', **210**Y', and **210**Z' via the viewing channels **714**B, **714**N, AND **714**I, respectively. The transition between the coverage region **220**A and the coverage region **220**B thereby can be conducted in a matter that is transparent to passengers traveling aboard the vehicle **400**.

The information system controller **312** (shown in FIG. **7**) (and/or the MDR host controller (MHC) module **760** (shown in FIG. **11**A)) preferably can automatically control the routing and distribution of the television programming content **210'**. Using the electronic program guide (EPG) data that is provided by the relevant satellite communication system **250**, the information system controller **312** can configure each DBS television receiver system **710** (shown in FIG. **7**) to provide the desired television programming content **210'** and can maintain an internal television channel map (not shown). By maintaining the internal television channel map, the information system controller **312** can keep track of the television programming content **210'** that is available via the satellite communication system **250**.

As discussed above, different satellite communication systems **250** can provide the common television programming content **210**X', **210**Y', and **210**Z', such as Cable News Network (CNN), via different satellite transponder systems. Therefore, when providing antenna control data for directing the universal antenna system **500** toward a different satellite communication system **250**, the information system controller **312** likewise can provide updated television channel mapping data to each DBS television receiver system **710**. The DBS television receiver systems **710** thereby can provide the common television programming content **210**X', **210**Y', and **210**Z' to the distribution system **330** for distribution throughout the vehicle information system **300** with limited interruption as the communications with the different satellite communication system **250** are established. Each DBS television receiver system **710** preferably includes an automatic broadcast mapping function for updating the internal television channel map.

In addition to (and/or as an alterative to) presenting the viewing content **210** (or the television programming content **210'**), the vehicle information system **300** can be configured to present viewing content indicia **280** via the passenger interfaces **320** as illustrated by FIG. **14**. In the manner by set-top boxes (not shown) can present information associated with the viewing content **210** in residences (shown in FIG. **3**), the passenger interfaces **320**, such as seatback display systems **324**, can present the viewing content indicia **280** associated with the viewing content **210** being presented. Illustrative viewing content indicia **280** can include a channel number **280**A, content source information **280**B, and/or a viewing content description **280**C of the viewing content **210**. The viewing content indicia **280** can be selected for viewing via the passenger interfaces **320**.

Although shown as being presented via an upper portion of the seatback display system **324**, it will be appreciated that the viewing content indicia **280** can be presented in any suitable manner. As desired, the viewing content indicia **280** can be presented visually and/or orally via the passenger interfaces **320**. One or more messages **290** likewise can be presented in the manner set forth above with reference to the viewing content indicia **280**. The messages **290** can include information related to the viewing content **210**, such as a potential for a momentary disruption in the viewing content **210** as the vehicle information system acquires a different satellite communication system **250** (shown in FIG. **3**). Other messages **290**, including travel alerts from the vehicle crew and/or communications from other passengers aboard the vehicle **400**, likewise can be presented via the passenger interfaces **320**. Exemplary travel alerts can include a "turbulence ahead" alert, a "prepare for landing" alert, and/or a "fasten seatbelts" alert, and preferably cannot be disabled from presentation by the passenger.

The vehicle information system **300** likewise can be configured to receive and selectably present advertising content **210**" as illustrated in FIG. **15**. The advertising content **210**" can be provided in any conventional manner, including in the manner set forth in more detail above with reference to the television content **210**' (shown in FIGS. **3** and **5**), and can be provided by one or more advertising content providers **230**". As shown in FIG. **15**, for example, the advertising content provider **230**A" provide advertising content **210**A'; whereas, advertising content **210**B", **210**C" are respectively provided via advertising content providers **230**B", **230**C". The advertising content **210**A", **210**B", and **210**C" is illustrated as being provided to a terrestrial central advertising content server system **238**, which can provide the advertising content **210**A", **210**B", and **210**C" as the advertising content **210**" to the vehicle information system **300**. In the manner discussed above, the central advertising content server system **238** can provide the advertising content **210**" to an uplink system **236** for distribution via at least one satellite communication system **250**.

Upon receiving the advertising content **210**", the vehicle information system **300** can distribute the received advertising content **210**" in the manner set forth above with reference to the viewing content **210** (and/or the television content **210**'). As desired, the server system **310** of the vehicle information system **300** can include a selected media (or file) server system **314**, or advertisement server system **318**, for storing the received advertising content **210**". The received advertising content **210**" can be presented in the manner set forth in more detail above with reference to the viewing content **210** (and/or the television programming content **210**' (shown in FIG. **3**)) and/or as discussed with regard to the messages **290** (and/or the viewing content indicia **280**). Since the television programming content **210**' typically includes recurring time slots for transmitted advertising content, the vehicle information system **300** can include selected advertising content **210**" in the television programming content **210**', substituting the selected advertising content **210**" for the transmitted advertising content, as desired.

The advertising content **210**", in a preferred embodiment, can include passenger-directed advertising content such as directed advertising content conventionally used in association with the Internet. Stated somewhat differently, the advertising content **210**" can be distributed to the passenger interfaces **320** in a dynamic manner. The vehicle information system **300** thereby can select advertising content **210**" that is suitable for presentation by each individual passenger interface **320** such that the selected advertising content **210**" is more likely to be relevant to the passenger who is using the passenger interface **320**. For example, the vehicle information system **300** can select advertising content **210**" for presentation via the particular passenger interface **320** based upon the usage of the particular passenger interface **320**. The usage of each passenger interface **320** can be associated with one or more selections, such as selections of viewing content **210**, made by the relevant passenger. Thereby, each passenger interface **320** can present the select advertising content **210**" that is more likely to be relevant to the interests of the associated passenger.

The disclosure is susceptible to various modifications and alternative forms, and specific examples thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the disclosure is not to be limited to the particular forms or methods disclosed, but to the contrary, the disclosure is to cover all modifications, equivalents, and alternatives.

What is claimed is:

1. A vehicle information system suitable for presenting selected viewing content provided via a predetermined satellite, comprising:

a multi-regional antenna system for receiving viewing content from the predetermined satellite in response to antenna status and control data and having an antenna steering system for directing said multi-regional antenna system toward the predetermined satellite in response to antenna positioning data, said multi-regional antenna system including at least one hemispherical lens that focuses incoming satellite signals comprising the viewing content, a feedstick system that travels over an exterior surface of said at least one hemispherical lens, and at least one sensor that collects the satellite signals focused by said at least one hemispherical lens;

an antenna control system for providing said antenna positioning data based upon a comparison of a position of the vehicle information system with a position of the predetermined satellite;

a universal receiver system for receiving the viewing content from said multi-regional antenna system and processing the viewing content to provide the selected viewing content for presentation in response to receiver configuration data; and

an information system controller for providing said antenna status and control data and said receiver configuration data each being based upon a comparison of said position of the vehicle information system with contour boundary data regarding the predetermined satellite based upon a preselected signal strength.

2. The vehicle information system of claim **1**, wherein said information system controller provides said antenna status and control data to said multi-regional antenna system as the vehicle information system approaches a coverage region associated with the predetermined satellite.

3. The vehicle information system of claim **1**, wherein said antenna status and control data configures said multi-regional antenna system to receive the viewing content with at least one predetermined reception characteristic.

4. The vehicle information system of claim **3**, wherein said at least one predetermined reception characteristic is selected from the group consisting of a signal frequency range and a signal polarization.

5. The vehicle information system of claim **1**, wherein said antenna control system continuously provides said antenna positioning data to said multi-regional antenna system.

6. The vehicle information system of claim **1**, wherein said information system controller provides said antenna positioning data to said multi-regional antenna system as the vehicle information system approaches a coverage region associated with the predetermined satellite.

7. The vehicle information system of claim **1**, wherein said antenna control system includes a position system for providing said position of the vehicle information system.

8. The vehicle information system of claim **7**, wherein said position system is selected from the group consisting of a Global Positioning Satellite (GPS) system and an Inertial Reference System (IRS).

9. The vehicle information system of claim **1**, wherein said antenna control system receives said position of the predetermined satellite from said information system controller.

10. The vehicle information system of claim **1**, wherein said antenna control system includes a predictive algorithm for maintaining a pointing accuracy of said multi-regional antenna system.

11. The vehicle information system of claim **10**, wherein said predictive algorithm comprises a second-order predictive algorithm for directing said multi-regional antenna system toward the predetermined satellite based upon rate of position change data when the vehicle information system experiences a high rate of turn.

12. The vehicle information system of claim **1**, wherein said information system controller provides said receiver configuration data to said universal receiver system as the vehicle information system approaches a coverage region associated with the predetermined satellite.

13. The vehicle information system of claim **1**, wherein said information system controller includes a database system for storing information regarding the predetermined satellite.

14. The vehicle information system of claim **13**, wherein said database system stores information regarding a plurality of satellites.

15. The vehicle information system of claim **13**, wherein said database system includes information regarding the predetermined satellite selected from the group consisting of the satellite position data, coverage region data, contour boundary data, transponder frequency data, signal polarization data, symbol rate data, video program identification (PID) data, audio program identification (PID) data, electronic program guide (EPG) data, forward error correction (FEC) data, and Program Clock Reference PID (PCR-PID) data.

16. The vehicle information system of claim **13**, wherein said database system includes the contour boundary data regarding the predetermined satellite.

17. The vehicle information system of claim **1**, wherein said preselected signal strength of said contour boundary data is −48 dBW.

18. The vehicle information system of claim **1**, further comprising a down-conversion system for converting the viewing content provided by said universal receiver system into converted viewing content having an intermediate frequency, said down-conversion system providing the converted viewing content to said universal receiver system for processing into the selected viewing content.

19. The vehicle information system of claim **18**, wherein said down-conversion system converts the viewing content into the converted viewing content in response to interface control data provided by said information system controller based upon said comparison of said position of the vehicle information system with said coverage region data for the predetermined satellite.

20. The vehicle information system of claim **19**, wherein said information system controller provides said interface control data to said down-conversion system as the vehicle information system approaches a coverage region associated with the predetermined satellite.

21. The vehicle information system of claim **1**, wherein said universal receiver system provides the selected viewing content to a distribution system.

22. The vehicle information system of claim **1**, wherein the vehicle information system is disposed aboard a vehicle.

23. A vehicle information system for installation aboard a passenger vehicle and for presenting selected viewing content provided via a predetermined satellite, comprising:

a vehicle position system for providing a vehicle position of the vehicle;

a multi-regional antenna system for receiving viewing content from the predetermined satellite in response to antenna status and control data and having an antenna steering system for directing said multi-regional antenna system toward the predetermined satellite in response to antenna positioning data, said multi-regional antenna system including at least one hemispherical lens that focuses incoming satellite signals comprising the viewing content, a feedstick system that travels over an exterior surface of said at least one hemispherical lens, and at least one sensor that collects the satellite signals focused by said at least one hemispherical lens;

an antenna control system for providing said antenna positioning data based upon a comparison of said vehicle position with a position of the predetermined satellite;

a down-conversion system for converting the viewing content provided by said universal receiver system into converted viewing content having an intermediate frequency in response to interface control data;

a universal receiver system for receiving the converted viewing content from said down-conversion system and processing the converted viewing content to provide the selected viewing content in response to receiver configuration data;

a distribution system for distributing the selected viewing content throughout the vehicle information system;

a passenger interface for presenting the selected viewing content distributed via the distribution system; and

an information system controller for providing said antenna status and control data and said receiver configuration data and having a database system for storing contour boundary data regarding the predetermined satellite based upon a preselected signal strength, said antenna status and control data and said receiver configuration data each being based upon a comparison of said vehicle position with the contour boundary data for the predetermined satellite.

24. The vehicle information system of claim **23**, wherein the vehicle information system is disposed aboard an airplane.

25. The vehicle information system of claim 23, wherein said distribution system comprises a wired distribution system.

26. The vehicle information system of claim 25, wherein said wired distribution system supports wired communications having a protocol type selected from the group of protocol standards consisting of Ethernet, Fast Ethernet, and Gigabit Ethernet.

27. The vehicle information system of claim 23, wherein said distribution system comprises a wireless distribution system.

28. The vehicle information system of claim 27, wherein said wireless distribution system supports wireless communications having a protocol type selected from the group of protocol standards consisting of Bluetooth, wireless fidelity (Wi-Fi), Ultra-Wideband (UWB), and IEEE 802.11.

29. The vehicle information system of claim 23, wherein said passenger interface includes at least one video display system selected from the group consisting of an overhead cabin display system, a seatback display system, and a handheld presentation system.

30. The vehicle information system of claim 23, wherein said passenger interface includes at least one audio presentation system selected from the group consisting of an overhead speaker system, headphones, and a handheld presentation system.

31. An aircraft, comprising:

a fuselage and a plurality of passengers seat arranged within the fuselage; and

a vehicle information system for presenting selected viewing content provided via a predetermined satellite, said vehicle information system coupled with said fuselage and comprising:

a vehicle position system for providing a vehicle position of the vehicle;

a multi-regional antenna system for receiving viewing content from the predetermined satellite in response to antenna status and control data and having an antenna steering system for directing said multi-regional antenna system toward the predetermined satellite in response to antenna positioning data, said multi-regional antenna system including at least one hemispherical lens that focuses incoming satellite signals comprising the viewing content, a feedstick system that travels over an exterior surface of said at least one hemispherical lens, and at least one sensor that collects the satellite signals focused by said at least one hemispherical lens;

an antenna control system for providing said antenna positioning data based upon a comparison of said vehicle position with a position of the predetermined satellite;

a down-conversion system for converting the viewing content provided by said universal receiver system into converted viewing content having an intermediate frequency in response to interface control data;

a universal receiver system for receiving the converted viewing content from said down-conversion system and processing the converted viewing content to provide the selected viewing content in response to receiver configuration data;

a passenger interface for presenting the selected viewing content distributed via a distribution system; and

an information system controller for providing said antenna status and control data and said receiver configuration data and having a database system for storing contour boundary data regarding the predetermined satellite based upon a preselected signal strength, said antenna status and control data and said receiver configuration data each being based upon a comparison of said vehicle position with the contour boundary data for the predetermined satellite.

32. A method for presenting selected viewing content provided via a predetermined satellite, comprising:

providing a vehicle information system having a multi-regional antenna system and a universal receiver system, said multi-regional antenna system including at least one hemispherical lens that focuses incoming satellite signals comprising the viewing content, a feedstick system that travels over an exterior surface of said at least one hemispherical lens, and at least one sensor that collects the satellite signals focused by said at least one hemispherical lens;

calibrating said multi-regional antenna system by sampling the viewing content received from the predetermined satellite at a plurality of different orientations of said multi-regional antenna system;

determining a position of said vehicle information system;

comparing said position of said vehicle information system with a position of the predetermined satellite to provide antenna positioning data;

comparing said position of said vehicle information system with contour boundary data for the predetermined satellite based upon a preselected signal strength to provide antenna status and control data and receiver configuration data;

directing said multi-regional antenna system toward the predetermined satellite in response to said antenna positioning data;

configuring said multi-regional antenna system to receive viewing content from the predetermined satellite in response to said antenna status and control data;

configuring said universal receiver system to process the received viewing content in response to said receiver configuration data;

receiving the viewing content via said multi-regional antenna system;

processing the received viewing content via said universal receiver system; and

providing the selected viewing content for presentation.

33. The method of claim 32, wherein said directing said multi-regional antenna system comprises directing said multi-regional antenna system as said multi-regional antenna system approaches a contour boundary associated with the predetermined satellite.

34. The method of claim 32, wherein said configuring said multi-regional antenna system includes configuring said multi-regional antenna system to receive the viewing content with at least one predetermined reception characteristic.

35. The method of claim 34, wherein said configuring said multi-regional antenna system includes configuring said multi-regional antenna system to receive the viewing content with said at least one predetermined reception characteristic being selected from the group consisting of a signal frequency range and a signal polarization.

36. The method of claim 32, wherein said positioning said multi-regional antenna system includes continuously providing said antenna positioning data to said multi-regional antenna system and continuously positioning said multi-regional antenna system.

37. The method of claim 32, wherein said positioning said multi-regional antenna system includes providing said antenna positioning data to said multi-regional antenna system as said multi-regional antenna system approaches a contour boundary associated with the predetermined satellite.

38. The method of claim **32**, wherein said positioning said multi-regional antenna system includes maintaining a pointing accuracy of said multi-regional antenna system via a predictive algorithm.

39. The method of claim **38**, wherein said maintaining said pointing accuracy of said multi-regional antenna system includes maintaining said pointing accuracy of said multi-regional antenna system via a second-order predictive algorithm for directing said multi-regional antenna system toward the predetermined satellite based upon rate of position change data when said multi-regional antenna system experiences a high rate of turn.

40. The method of claim **32**, wherein said configuring said universal receiver system includes configuring said universal receiver system to process the received viewing content as said universal receiver system approaches a contour boundary associated with the predetermined satellite.

41. The method of claim **32**, further comprising converting the received viewing content into converted viewing content having an intermediate frequency and providing the converted viewing content to said universal receiver system for processing into the selected viewing content.

42. The method of claim **41**, wherein said converting the received viewing content includes converting the received viewing content in response to said antenna status and control data.

43. The method of claim **32**, further comprising distributing the selected viewing content to at least one passenger interface.

44. The method of claim **32**, wherein said providing said multi-regional antenna system and said universal receiver system includes disposing said multi-regional antenna system and said universal receiver system aboard a vehicle.

45. The method of claim **32**, wherein said calibrating said multi-regional antenna system comprises automatically calibrating said multi-regional antenna system.

46. The method of claim **32**, wherein said calibrating said multi-regional antenna system includes sampling the viewing content at three different orientations of said multi-regional antenna system.

47. The method of claim **32**, wherein said calibrating said multi-regional antenna system includes sampling the viewing content at said different orientations, which are separated by an angular displacement at least ninety degrees.

48. The method of claim **32**, wherein said calibrating said multi-regional antenna system includes measuring a signal strength of the viewing content at each of said orientations of said multi-regional antenna system.

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